

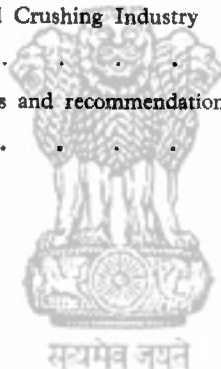


GOVERNMENT OF INDIA
MINISTRY OF FOOD AND AGRICULTURE

Report
OF THE
Oilseeds Crushing Industry
Inquiry Committee
1956

TABLE OF CONTENTS

| | PAGE |
|--|------|
| INTRODUCTION | (ii) |
| 1. Efficiency of Mills and Ghanis | 1 |
| 2. Nutritional value of oils and oilcakes produced by Mills and Ghanis | 3 |
| 3. Industries dependent upon vegetable oils | 6 |
| 4. Employment possibilities of the Oilseeds Crushing Industry | 10 |
| 5. Reservation of Edible Oilseeds for Ghani Industry | 14 |
| 6. Exports of Oils and Oilseeds | 18 |
| 7. Cess on Oils and Oilseeds | 20 |
| 8. Assistance to the Village Oilseeds Crushing Industry | 22 |
| 9. Organisation for control of Oilseeds Crushing Industry. | 26 |
| 10. Minor Oilseeds | 29 |
| 11. Development of Cottonseed Crushing Industry | 31 |
| 12. Acknowledgements | 35 |
| 12. (a) Summary of conclusions and recommendations | 36 |
| 13. Appendices | 40 |



INTRODUCTION

The Oilseeds Crushing Industry Inquiry Committee was set up by the Government of India to carry out a rapid survey of the state of the Oilseeds Crushing Industry in the country and to recommend the lines on which the industry should be developed in future. The terms of reference of the Committee are given below:—

To carry out a rapid survey of the state of Oilseeds Crushing Industry (crushing both by mills and by village ghanis) in the country and to recommend the lines on which this industry should be developed in future; in particular, to examine and report:

- (a) whether it is necessary to increase or to reduce the existing oilseeds crushing capacity of mills in the country;
- (b) whether it would be desirable to reserve any particular oilseeds for crushing by the village ghani only having regard to the effect of such reservation on the efficiency of production of oil and its nutritional value and having regard further to its effect on employment, supply of oil to consuming industries and exports; and
- (c) whether it is necessary to give any assistance to the village oil crushing industry and if so, in what form.

2. The Committee originally consisted of the following:—

Chairman

- (1) Shri P. A. Gopalkrishnan, I.C.S., Joint Secretary to the Government of India, Ministry of Food & Agriculture.

Members

- (2) Shri R. L. Mehta, I.A.S., Joint Secretary to the Government of India, Ministry of Food and Agriculture.
- (3) Shri Ratilal M. Gandhi, Vice-President, Indian Central Oilseeds Committee, 111, Mahatma Gandhi Road, Fort, Bombay.
- (4) Shri Jhaverbhai Patel, Officer on Special Duty, Planning Commission, New Delhi.
- (5) Shri Satish Chandra Das Gupta, C/o Khadi Pratishthan, Sodepore (Calcutta).

(iii)

(6) Mrs. Prema Johari, Deputy Secretary to the Government of India, Ministry of Production, New Delhi.

(7) Dr. K. S. Murti, Principal, Oil Technological Institute, Anantapur (Andhra).

Secretary

(8) Shri F. C. Gera, Under Secretary to the Government of India, Ministry of Food & Agriculture, New Delhi.

3. On account of pressure of other work, Shri Gopalkrishnan ceased to be the Chairman of the Committee with effect from the 16th November, 1955, and Shri T. C. Puri, I.C.S., was appointed as Chairman of the Committee from that date.

4. The Committee held 11 meetings and examined a number of witnesses. In addition, the Committee issued questionnaires to all State Governments. The Committee also issued questionnaires to all State Organisations of oil millers and a number of Chambers of Commerce and Industry and All-India Organisations of the industries dependent upon vegetable oil as the raw material. Excluding the State Governments, questionnaires were issued to 58 Organisations connected with the vegetable oil industry. Replies were received from 34 of them.

5. The Committee also visited Kanpur to visit on the spot old type ghanis, improved type ghanis and mills of various types. At Kanpur the Committee also had a long discussion with a number of representatives of the Oil Mill Industry. The Committee also visited Lucknow where they had a most valuable discussion with Shri Vichitra Narain, Minister, Uttar Pradesh Government, on the subject of Oilseeds Crushing Industry.

6. A copy of the Resolution of the Government of India setting up the Committee is at Appendix 'A'.

7. Copies of the questionnaires issued by the Committee are at Appendices 'B', 'C', 'D', 'E', 'F' and 'G'.

CHAPTER I

EFFICIENCY OF MILLS AND GHANIS

One of the arguments frequently advanced against encouragement being given to the village oil industry is that this industry is highly inefficient and antiquated and that it is a waste of vegetable oil resources of the country to extract oil through ghanis. The mill sector of the industry in reply to the questionnaires issued by the Committee has laid considerable emphasis on the inefficiency of the ghanis. Our enquiries show that there is some force in this contention though not all the mills are efficient nor all the ghanis inefficient. The following figures of extraction of oil have been furnished to the Committee by the Harcourt Butler Technological Institute, Kanpur:—

| Name of oilseeds | % of oil through mill pressing | % of oil through old type ghanis | % of oil through improved type Wardha Ghanis |
|----------------------|--------------------------------|----------------------------------|--|
| Groundnut | 40% | 35% | 36% |
| Mustard | 35% | 30% | 32% |
| Linseed | 35% | 30% | 32% |
| Sesamum | 42% | 37% | 39% |
| Coconut | 64% | 58% | 60% |
| Castorseed | 40% | 35% | 37% |

2. Regarding coconut, the Indian Central Coconut Committee have informed us that the yield of oil from copra crushed in old type ghanis is about 58 per cent. to 60 per cent.; in rotary mills it is 60 per cent. to 62 per cent. and in expellers it is 63 per cent. to 65 per cent.

3. The Oil Technological Institute, Anantapur, have a regular programme of analysis of oil cakes obtained by expellers, rotary mills and village ghanis and have been good enough to furnish to the Committee the analytical data collected by them during 1952 to 1955. These data will be found in Appendices H, I and J attached to this report.

4. It would appear from these data that the percentage of oil on a 5 per cent. moisture basis varied from 5.7 per cent. to 11.6 per cent. in the case of expeller-produced groundnut cakes. In the case of ghani produced groundnut cakes, it varied from 8.4 per cent. to 11.6

per cent. In the case of Sesamum oil cakes, this percentage varied from 10 per cent. to 18.4 per cent. in the case of ghanis and 10.7 per cent. to 12.4 per cent. in the case of rotaries. In the case of Castor cake, it ranged from 6.7 per cent. to 7.9 per cent. in the case of expellers and 7.1 per cent. to 9.7 per cent. in the case of ghanis. There is no doubt that the extraction of oil is lower in the case of ghanis than in the case of both the power-driven rotaries and the expellers.

5. While the difference between the extraction of oil by indigenous ghanis and by mills, as explained above, is considerable, the percentage of extraction achieved by the improved type ghanis (popularly known as the 'Wardha Ghanis') is higher than the old type ghanis.

6. According to the experiments carried out by the Indian Central Oilseeds Committee, this percentage has been as high as 41.64 in the case of groundnut. In this connection, the following figures of oil content of cakes obtained from various pressing units analysed in the laboratories of the Harcourt Butler Technological Institute, Kanpur, would be of interest:—

| Pressing Unit | Linseed cake | Mustard cake | Til cake |
|---|--------------|--------------|-----------|
| Ordinary ghani driven by bullocks. | 14.15% | 15.16% | 14.15% |
| Improved Wardha Ghani driven by bullocks. | 12.58% | 11.2% | 12.54% |
| Bengal type power-driven ghanis. | 11% | 10.5 to 11% | 11 to 12% |
| Bombay type of power-driven ghanis. | 11% | 10.5% | 11% |
| Expellers | 7 to 7.5% | 8.0% | 9.0% |
| Cage type Hydraulic press . | 8.9% | 8.0% | 8.0% |

7. It is obvious that the Wardha Ghani is a considerable improvement on the old type ghani and if a large scale programme of replacement of old type ghanis by Wardha Ghanis is launched, the loss in oil as between the ghanis and mills would be considerably reduced.

CHAPTER II

NUTRITIVE VALUE OF OILS AND OILCAKES PRODUCED BY MILLS AND GHANIS

There is a considerable paucity of scientific data on the subject of nutritional value of oils and oilcakes produced by mills and ghanis. We asked a number of important Institutes in the country whether they had carried out any experiments on the comparative nutritive value of oils produced by ghanis and those produced by mills and were told that they had not carried out any such experiments.

2. We also asked all the State Governments whether any experiments had been carried out in the States on the nutritive value of oils and cakes and were told that no such experiments had been carried out though some of the State Governments reported the widespread belief that ghani oil was more nutritive than mill oil.

3. We also asked the Directorate General of Health Services whether they had carried out any research on the nutritive value of oils produced by ghanis and mills and were told that no such research had been carried out by the Directorate. However, it is undeniable that there is a marked preference in the country for ghani oil over the mill oil so far as domestic consumption is concerned. Indeed, allegations have been made that some village oilmen adulterate mill oil with ghani oil and sell it as ghani oil. The consumers also, in general, are ready to pay a little more for ghani oil even though mill oil is usually cheaper. सत्यमेव जयते

4. A Food Technologist of some standing, whom we examined as a witness, told us that there was a little more of Vitamin 'E' in the ghani oil than in the mill oil, though he felt that this did not materially contribute to the overall nutritive contents of the normal levels of food consumption in the country, as Vitamin 'E' was also present in a number of other articles of food consumed by the Indian population.

5. On the whole, it has to be conceded that ghani oil is more palatable than mill oil and that according to popular opinion it is slightly more nutritious than the mill oil. As such we feel that there is every justification for ensuring that ghani oil unadulterated with mill oil is made available to the consumers for domestic consumption in the quantities required by them. We would recommend, however, that filtration of ghani oil should be encouraged on a large scale.

6. We have also been told that ghani oil has a little more of natural pigments which, coupled with its slightly higher Vitamin 'E' content, may contribute slightly to its keeping quality. The Central Food Technological Research Institute, Mysore, have collected some data about the keeping quality of ghani and expeller pressed oil and these data are given in Appendix 'Q' attached to this Report.

7. Regarding oilcakes, experiments have been carried out by the Indian Veterinary Research Institute, Izatnagar, on the nutritive value of cakes produced by expellers, solvent extraction and ghani. A summary of the results is given in Appendix 'R' attached to this report. It would appear that there is no difference in the total digestible nutrients in the various cakes. Digestible protein, ether extract and total carbohydrates contribute towards the total digestible nutrients. The digestibility of ether extract has been observed to increase with increase in the fat level of the ration. The comparatively lower amount of energy available due to lower ether extract content of the solvent extracted cake is made up by its slightly higher contents of protein and carbohydrates. Thus the available total digestible nutrients of the rations containing any of these types of cakes remain more or less of the same order.

8. In this connection we would also like to quote from a letter from the National Cottonseed Products Association in the U.S.A. in reply to a letter from one of the members of the Committee:—

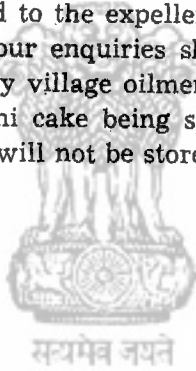
"In the United States, cake or meal that has been processed mechanically and contains from 3.5 to 5.5 per cent. oil commands a higher price than that which has been solvent extracted and contains very little oil. At the present time, in the Memphis market there is about \$2.00 per ton difference between the two types of cake or meal.

The differential in price does not appear to be related to differences in nutritive value. Repeated experiments at a number of the State colleges have shown no significant nutritional differences between the two types of cake or meal. The type containing a higher percentage of Fat would, of course, furnish an animal with a somewhat greater number of calories."

The fact that the cake containing a higher percentage of oil would furnish the animals with a somewhat greater number of calories is really the crux of the matter in this country. It is all very well under the laboratory conditions to discover as a result of experiments carried on animals fed with balanced rations that there is no great

difference in the nutritive value of oil cakes with a larger or smaller quantity of oil in it. In the conditions prevailing in India where malnutrition of animals is the rule and their balanced feeding an exception, it is vital in our view that they are fed on cakes containing a higher percentage of oil. There is also another important factor to be considered in this connection, namely, that the result of crushing of oilseeds by ghanis is that the cake remains in the villages and is fed to the cattle. If ghanis continue to disappear, as has been the case with the growth of the mill industry, the oilcakes would concentrate in towns and cities and would not easily return to the villages. They were more likely to be sold in bulk for use as manures or for export than to return to the villages for consumption by cattle.

We have been told Ghani-pressed cake undergoes quicker spoilage because the fat in the cake gets split by the anzyme (associated with the seed) in a very short time. This reduces the keeping quality of the ghani cake compared to the expeller-produced cake which has a lower oil content. But our enquiries show that ghani cakes produced in small quantities by village oilmen are easily sold and there is little danger of the ghani cake being spoiled by long storage for the simple reason that this will not be stored for a long time.



CHAPTER III

INDUSTRIES DEPENDENT UPON VEGETABLE OILS

The major industries dependent upon vegetable oils are the following:—

- (a) Vanaspati.
- (b) Soap.
- (c) Paints and Varnishes.
- (d) Pharmaceutical.

2. In addition, small quantities of vegetable oils are used in the manufacture of biscuits, in the tanning, woollen and cotton textile industries and for lubrication purposes. It is understood during the year 1953, about 2,27,110 tons of vegetable oils were used in the manufacture of vanaspati. This figure rose to 2,60,000 tons in the year 1954 and 2,99,915 tons in the year 1955. The production of vanaspati in the year 1953 was estimated to be 1,91,626 tons and in the year 1954 it was estimated to be 2,30,749 tons. In 1955, the figure rose to 2,60,827 tons. The break up of the figure of consumption of vegetable oils by the vanaspati industry for the three years is given below:—

| Name of oil | 1953 (tons) | 1954 (tons) | 1955 (tons) |
|----------------------|----------------|----------------|----------------|
| Groundnut . . . | 1,82,370 | 2,36,160 | 2,81,398 |
| Sesamum . . . | 15,680 | 15,280 | 16,249 |
| Cottonseed . . . | 8,530 | 8,060 | 444 |
| Coconut . . . | 5,830 | .. | .. |
| Rape and Mustard . . | 6,100 | .. | .. |
| Linseed . . . | 6,100 | .. | .. |
| Other oils . . . | 2,500 | .. | 1,824 |
| TOTAL . . . | 2,27,110 | 2,60,000 | 2,99,915 |

3. We asked the representatives of the vanaspati manufactures what their reaction would be if all edible oils were reserved for production through ghanis and they stated that they would strongly object to it. The reason is that ghani oil contains a higher percentage of Mucilagenous and Albuminous impurities as compared to mill oil and that refining losses in the former would be greater than in the latter.

Then there would be difficulties in collecting small quantities of oil from numerous ghanis scattered all over the country for conversion into hydrogenated oils. Lastly, some of the vanaspati factories had their own plants for production of vegetable oils and if they were prevented from crushing vegetable seeds for their own use, the plants would become idle and would cause serious loss to them. They have also stated that India was developing a small export trade in vanaspati and if all edible oils were reserved for production by ghanis, the cost of production of vanaspati would increase and this in turn would affect the export trade. We consider that there is force in these contentions and we are, therefore, of the view that the vanaspati industry may continue to draw its requirements of vegetable oil from the existing sources, namely, the vegetable oil mills. In a subsequent chapter of this report, we have recommended that the mill industry may continue to operate its installed crushing capacity except in the case of Sesamum and we are satisfied that the installed crushing capacity of the milling industry is adequate for the needs of the vanaspati industry. Regarding Sesamum, the industry consumed 16,249 tons of Sesamum in the year 1955 and we have no objection to its drawing its requirements of Sesamum oil from the mill sector of the vegetable oil industry.

4. Regarding the soap industry, an All-India organisation of soap and toiletries makers has told us that the production of washing soap by the organised sector was about 70,900 tons in the year 1954. The production by the cottage sector was 44,000 tons. The quantity of toilet soaps produced was about 15,500 tons, while that of medicated soap was about 250 tons. Other soaps (e.g., liquid soap etc.) produced total 1,350 tons. The total quantities of oils used by the soap industry are estimated as follows:—

| | |
|-------------------------|---------------------|
| Groundnut oil | 26,290 tons. |
| Coconut oil | 17,895 tons. |
| TOTAL | <u>44,185 tons.</u> |

5. We asked a representative organisation of soap manufacturers what their reaction would be if all edible oils were reserved for production through ghanis and their reaction was identical to that of the vanaspati manufacturers. The reasons also were practically the same, namely, that there would be difficulties in collecting small quantities of oils from village oilmen, that the cost of production of soap would increase and that the vegetable oilseed crushing plants of the manufacturers would become idle. As in the case of Vanaspati, we are of the view that the requirements of the soap factories can

be met by the existing installed capacity of the oil mills and these mills may continue to meet them. Considerable quantities of ghani oil are also used by the cottage sector of the soap industry and far from ghani oil becoming scarce as a result of our recommendations, if executed, its supply is likely to increase and the cottage sector of the soap industry is bound to receive a fillip as a consequence.

6. Regarding paints and varnishes industry, it is understood it uses nearly 45,000 tons of linseed oil per year. This figure was estimated for 1953-54 and might be an underestimate at the present moment. The paints and varnishes industry obtains all its requirements of linseed oil from the mill sector of the vegetable oil industry and that sector can continue to cater to the needs of the paints and varnishes industry in the future also.

7. The requirements of the tanning, cotton and woollen textile and biscuit industries are not substantial and are not likely to be affected by encouragement being given to the village oil industry.

8. Regarding Pharmaceutical industry, we have not been able to obtain an accurate estimate of its requirements. According to one estimate, the quantities of vegetable oils consumed for medicinal and toilet purposes are as follows:—

| | |
|----------------------------|--------------|
| Sesamum oil | 16,000 tons. |
| Castor oil | 16,000 tons. |
| Rape and Mustard | 2,000 tons. |

9. Small quantities of groundnut oil are also used by the Pharmaceutical Industry.

10. A Pharmaceutical Scientist told us that ghani oil would suit their purpose better in some cases. The Pharmaceutical industry is interested for some purposes in receiving the oil from the oilseeds in fractions rather than in a single operation as is the case in the case of expellers. The following data have been furnished to us in this connection:—

| No. of Fraction | I | II | III |
|------------------------------|-----|-----|-----|
| Acid value | 3.9 | 4.9 | 6.9 |
| Peroxide value | 3.9 | 4.9 | 11 |
| Colour Index | 365 | 415 | 510 |
| Tocopherol (mg./100 gm.) . . | 24 | 18 | 16 |

The latter fractions are considered to be of an inferior quality and instead of taking the whole extract, the pharmaceutical industry would prefer to separate the first fraction for pharmaceutical use

leaving the other two fractions for other uses. In view of the above results and in view of the fact that much higher pressures and temperatures are obtained in expellers than in ghanis, they consider that a better quality oil could be obtained from ghanis than from expellers so far as some pharmaceutical uses were concerned. But if the pharmaceutical industry needs any quantity of vegetable oils from the mill sector, we have no objection to that sector continuing to meet the requirements of that industry.



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CHAPTER IV

EMPLOYMENT POSSIBILITIES OF THE OILSEEDS CRUSHING INDUSTRY

According to an estimate of the Indian Central Oilseeds Committee, the number of oil mills in the Indian Union is 8,201 at present. Mill for this purpose means any premises in which oilseeds are crushed with the aid of power. This number includes even single rotaries. Appendix 'O' attached to this report gives the number of mills in the various States in India. A photographic map showing the distribution of mills in the various States is also enclosed.

2. We have not been able to get an accurate estimate of the number of men employed in the oil mills. We asked all the State Governments to give us the number of men employed in the oil mills and not all of them were able to give the required information. The names of the States who furnished a reply to this question and the number of men employed in the mills in those States, as indicated by them, are given below:—

| Name of State | Number of men employed |
|------------------------------|---------------------------|
| 1. Hyderabad | 6,667 |
| 2. Vindhya Pradesh | 37 |
| 3. Uttar Pradesh | 5,000 |
| 4. Bombay | 10,000 |
| 5. Kutch | 85 |
| 6. Madras | 3,364 |
| 7. Saurashtra | 3,259 |
| 8. Madhya Bharat | 3,932 |
| 9. West Bengal | 3,000 |
| 10. Bihar | 4,036 |
| 11. Andhra | 11,345 |
| 12. Rajasthan | 1,150 |
| 13. Punjab | 1,815 |
| 14. Mysore | 690 |
| | 54,290 |

3. The Madras Government have stated that their figure of men employed in mills pertains only to the mills registered under the Factories Act. The West Bengal Government have stated that their figure of men employed in mills relates to 1952 and is an under-estimate now. For purposes of men employed in Madras and West Bengal, therefore, we had to use the figures of men employed in the

mills as given by the State Organizations of Oil Millers. The West Bengal Oil Millers' Association have told us that the number of men employed in oil mills in West Bengal is 8,000. The Madras Oil and Seed Association have told us that the number of men employed in oil mills in that State is about 18,000. If the figures given by these Associations are substituted for the figures furnished by the State Government (who have stated that their figures were an underestimate), the total number of men employed in the mills in the States mentioned above, would come to about 73,926. The total number of mills in these fourteen States is 7,357. This gives roughly an average of ten persons per mill. On this basis the total number of persons employed in the mills in the whole country including the States who have not furnished the figures of employment of men would be about 82,010. For working out the figures of men employed in the oil mills in the various States, we would have been quite prepared to accept the figures furnished by the Oil Millers' Associations, but in the first place only a few associations have attempted to answer the question. Secondly their territorial jurisdiction does not correspond to the territories of States and there is a danger of overlapping, and thirdly many of them have stated that their estimates are not accurate. In our opinion the figure of men employed in the oil mills as worked out by us (82,010) is on the whole fairly accurate.

4. Regarding the number of men that could be employed in the oil mills if they were worked to capacity, the data furnished by the State Governments are even more unsatisfactory. Even some of those States who have furnished figures of men employed in the mills at present, have not furnished figures of men that could be employed if the mills were worked to their full capacity. One State has said that the number would increase by about 25 per cent. A couple of States have stated that the number would increase by 50 per cent. Even if the number increases by about 50 per cent., the maximum number of persons who could be employed in the mills when working to their installed capacity would be about 1,20,000.

5. Regarding ghanis, according to the Livestock Census of 1951, there were 4,46,436 ghanis in the country in that year. (A photographic map showing the number of ghanis in the various States in India is attached to this report). 2,42,430 ghanis had a capacity of 5 seers or more and 2,04,006 ghanis had a capacity of less than 5 seers. Our enquiries show that the running of the ghanis is a whole-time occupation with some oilmen and a part-time occupation with others. Our enquiries further show that some ghanis are run as a subsidiary occupation by agriculturists. Numerous complaints have

been received from the representatives of the Village Oilseeds Crushing Industry that the number of ghanis is dwindling. Some of the State Governments have also brought this to our notice. The West Bengal Government have told us that while in 1911, 21,470 persons were employed in operating the ghanis, this number fell to 3,289 in 1951. It would appear that the number of ghanis in actual operation is probably lower than the number registered in the Live-stock Census of 1951. It has also been brought to our notice that some oilmen keep the ghanis without running them and that they even buy mill oil and sell it off as ghani oil at a profit without running the ghani. As mentioned by us in a previous chapter, the consumers are ready to pay a higher price for the ghani oil.

6. We have also not been able to get an accurate estimate of numbers employed on ghanis. In fact, accurate statistics are not available about many aspects of the oilseeds crushing industry. A Committee appointed by the Planning Commission for the village and small scale industries, presided over by Prof. D. G. Karve, has recently reported that some 1,50,000 self-supporting persons were employed in the ghani industry. We have mentioned already that while there are some whole-time village oilmen, there are others whose main occupation is running the ghani but who have other subsidiary occupations, while there are still others with whom ghani industry is a secondary occupation. Our enquiries further show that while some ghanis are operated by a single person, others require 2 persons while still others require one adult and one boy to operate them. Roughly, we consider that, allowing for certain ghanis not being in operation, on an average about 5 lakh persons are probably wholly or partially employed in the ghani industry.

7. It has been mentioned above that 2,04,006 ghanis have a capacity of 5 seers or less while 2,42,430 ghanis have a capacity of 5 seers or more. In addition, there are some Wardha Ghanis which have a capacity of 10 seers per charge. The total crushing capacity of these ghanis has been estimated to be about 19,37,064 tons (Appendix 'K' indicates how the crushing capacity has been worked out). It is further estimated that at the present moment about half of this capacity is utilised. If this capacity were fully utilised, nearly 7 lakh persons could be maintained by the ghani industry on an average of about 3 persons for every two ghanis.

8. On the other hand, the oil mills have a crushing capacity of about 30,89,015 tons on the basis of one shift of 8 hours per day (Appendix 'L' explains how this capacity has been worked out). It

is estimated that the utilised capacity of the mills is about 20,72,000 tons. Roughly, on the above basis of a single shift about 67 per cent. of the installed capacity of the mills is at present utilised and about 33 per cent. remains unutilised.

9. We have mentioned above that the number of persons employed in the milling industry at the present moment is about 82,010.

This number would increase to 1,20,000, if the crushing capacity of the industry were fully utilised. This crushing capacity, as indicated above, is about 30,89,015 tons. So that, the mill industry would employ 1,20,000 persons for crushing 30,89,015 tons while the ghani industry can employ about 7 lakh persons for crushing about 20 lakh tons. It is obvious that the ghani has far better employment possibilities. In our opinion, this should be the most important consideration at the present stage of India's development and in view of the superior employment possibilities of the ghani industry, there is a case for giving every possible encouragement to it even if it means a slight loss of the total vegetable oil resources of the country. We propose to discuss in subsequent chapters of this report the assistance that should be given to the village oil industry.



CHAPTER V

RESERVATION OF EDIBLE OILSEEDS FOR GHANI INDUSTRY

The production of major oilseeds in the country during 1954-55 was follows:—

| | |
|----------------------------|------------------|
| Groundnut | 38.23 lakh tons. |
| Sesamum | 5.92 lakh tons. |
| Rape and Mustard | 9.62 lakh tons. |
| Linseed | 3.88 lakh tons. |
| Castorseed | 1.12 lakh tons. |

(Photographic maps showing the production of these seeds in the various States of India are also attached to this Report).

2. The estimated production of coconuts during the year 1954-55 was 5.69 lakh tons in terms of copra. Of the total production of coconuts in India, it is estimated that over 46 per cent. is actually converted into copra. The remaining 54 per cent. is utilised for domestic consumption, for seed purposes and in religious ceremonies. Of the copra produced 21 per cent. is used for edible purposes and the rest only is available for crushing. The following is the estimate for production of milling and edible copra for the year 1954-55:—

| | | |
|-------------------------|-----------------|--------------------------------------|
| Edible copra | 0.55 lakh tons. | |
| Milling copra | 2.07 lakh tons | (This includes imported copra also). |

3. We have not been able to get very accurate figures of the percentage of seed crushed by ghanis though fairly accurate estimates of the quantities crushed by mills are available. According to one estimate, the percentage of oilseeds crushed in ghanis and that crushed in power mills is as follows:

| Name of seed | Crushed by ghanis % | Crushed in mills. % |
|----------------------------|------------------------|---|
| Groundnut | 20 | 80 |
| Coconut | 20 | 80 |
| Linseed | 30 | 70 |
| Castorseed | .. | 100 (a small quantity is also crushed in ghanis). |
| Cottonseed | .. | 100 |
| Rape and Mustard | 37 | 63 |
| Sesamum | 83 | 17 |

4. Of the above major oilseeds, only castor seed is non-edible. Linseed, though classified as an edible oilseed, is not largely used for edible purposes. All the rest are edible seeds. The production of castor seed, as stated above, was only 1.12 lakh tons against a total production of all other oil seeds of 57.65 lakh tons. The quantity of these oilseeds crushed per annum is about 37 lakh tons. This figure does not include cotton seed. In addition there is the milling copra internally produced and imported to the extent of 2.07 lakh tons. The existing crushing capacity of all the ghanis in position at the time of the Livestock Census of 1951 is nearly 20 lakh tons as explained in a previous chapter of this report. Even if all those ghanis are in existence now, they would be unable to cope with the crushing of all the edible oilseeds produced in the country. The suggestion to reserve all edible oilseeds for crushing by ghanis is, therefore, impracticable, even if it were otherwise in the interests of the country. This would not, however, necessarily be the case if we take into account only the edible oils used for direct domestic consumption and exclude edible oils used in various industries and for exports.

5. We asked all the State Governments in India what they thought of the suggestion that all edible oilseeds should be reserved for ghanis and non-edible oilseeds for mills. Only one State which is wholly in favour of this suggestion is of the view that the existing number of ghanis in that State would be able to cope with the crushing of all edible oilseeds produced in that State. All the rest are either opposed to this suggestion or feel that it is impracticable. A couple of States are in favour of this suggestion only as an ultimate goal and do not expect that it could be enforced within a short period. The Hyderabad Government told us that about 2,20,000 additional ghanis would be required to cope with the crushing of all edible oilseeds produced in Hyderabad.

The U.P. Government are of the view that if all the 1½ lakh ghanis in that State are replaced by the improved Wardha Ghanis, they could, perhaps, crush all the edible oilseeds produced in U.P. They have added that this replacement would be a stupendous task. The Bombay Government are of the view that for crushing all the edible oilseeds produced in Bombay, 10,000 village ghanis would have to be replaced by improved ghanis and an additional 14,200 improved ghanis would have to be installed. The Madras Government have stated that 13,963 additional ghanis would be required for crushing all the edible oilseeds in the State. The Punjab Government have stated that the number of existing ghanis in Punjab would have to

be increased 10 times if they were to crush all the edible oilseeds. Jammu and Kashmir expect that 1,500 additional ghanis would be required. Rajasthan puts this figure at 5,000. Andhra Government say that the number of ghanis in Andhra would have to be increased by about 50 per cent. West Bengal have stated that about 16,000 additional ghanis would be required. Madhya Bharat put this figure at 2,000. Himachal Pradesh have stated that the number of ghanis will have to be doubled.

6. It is obvious that all edible oilseeds cannot be crushed by the existing number of ghanis. Nor does it appear to us to be desirable that the oil milling industry should be eliminated from the country. As stated in a previous chapter of this report the oil milling industry is employing about 82,010 persons. A number of other industries are dependent upon the oil milling industry and we consider that the oil milling industry is entitled to a place in India's economy.

7. On the other hand, on account of the large employment potential of the ghani industry, some reservation of oilseeds for this industry appears to us to be most essential.

After giving this matter our careful consideration, we recommend that the installed crushing capacity of the milling industry may be allowed to operate in respect of all oilseeds except Sesamum.

8. Regarding Sesamum, we recommend that the mill sector may continue to supply sesamum oil for the requirements of the vanaspati and other industries and for exports. All requirements of Sesamum oil for domestic consumption should be met by the ghanis. In our opinion this will cause no hardship to the mill industry. The quantity of sesamum oil produced by the power mills was only 23,642 tons in 1954-55. Against this the Vanaspati Industry alone consumed 16,249 tons of this oil in the Calendar year 1955 and there might be increased consumption in further years. Some quantities are also used in the Pharmaceutical Industry and we are confident that reservation of Sesamum seed for crushing by ghanis, so far as the domestic consumption of sesamum oil is concerned, will cause no dislocation in the mill sector and then the mills crushing sesamum at present can freely crush other oilseeds so long as they do not exceed their installed capacity.

9. We also consider that no more power-driven mills should be set up in the country hereafter. We have reasons to believe that this suggestion will be acceptable to the mill industry in view of the

fact that the installed capacity of the mill industry is not fully utilised at the present moment. There is little point in installing new mills unless the existing mills are fully utilised.

10. We shall discuss in a separate chapter of this report how the above recommendation should be carried out. In our opinion, the execution of these recommendations will not present any insuperable difficulties.

11. We propose to deal with cotton seed in a separate chapter later in this report.



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CHAPTER VI

EXPORT OF OILS, OILSEEDS AND OILCAKES

The exports of major oils, oilseeds and oilcakes from India during the years 1952-53, 1953-54 and 1954-55 were as follows:—

| Name of the oilseeds/oils/oilcakes | 1952-53 | 1953-54 | 1954-55 | 1952-53 | 1953-54 | 1954-55 |
|------------------------------------|--------------------|----------|------------|-------------------|-------------|--------------|
| | (Quantity in Tons) | | | (Value in Rupees) | | |
| <i>Oilseeds</i> | | | | | | |
| Groundnut . | 12,736 | 5,326 | 22,802 | 1,39,71,835 | 62,92,954 | 2,51,14,090 |
| Castor . | 4,311 | Nil | Nil | 37,86,205 | Nil | Nil |
| Linseed . | 68 | Nil | Nil | 52,760 | Nil | Nil |
| Rape & Mustard | 47 | 139 | 107 | 38,360 | 1,23,935 | 96,719 |
| Sesamum . | 2,348 | 3 | Nil | 24,99,110 | 4,212 | Nil |
| Others . | 32,801 | 17,014 | 16,014 | 2,05,20,652 | 98,89,849 | 92,84,990 |
| TOTAL . | 52,311 | 22,482 | 38,203 | 4,08,68,922 | 1,68,10,950 | 3,44,95,779 |
| <i>Oils</i> | | | | | | |
| Groundnut . | 68,246.7 | 1,449.5 | 91,885.7 | 10,47,03,369 | 24,73,529 | 11,87,96,164 |
| Castor . | 37,770.3 | 19,213.7 | 29,774.6 | 7,72,22,070 | 3,19,45,497 | 3,49,78,875 |
| Linseed . | 29,048.7 | 3,776.6 | 10,118.3 | 4,82,37,344 | 54,71,607 | 1,15,68,720 |
| Rape & Mustard | 8,386.1 | 328.6 | 479.9 | 1,95,99,957 | 7,43,185 | 9,07,765 |
| Sesamum . | Less than one ton | | | 93 | 372 | 451 |
| Others . | 10,197.3 | 6,965.3 | 20,270.5 | 1,57,18,946 | 83,04,679 | 2,38,44,239 |
| Total . | 1,53,649.1 | 31,783.7 | 1,52,530.0 | 26,54,81,779 | 4,89,38,869 | 19,00,96,214 |
| <i>Oilcakes</i> | | | | | | |
| All sorts . | 5,557 | 6,119 | 38,777 | 2,23,966 | 8,12,794 | 1,45,35,432 |

12. A suggestion was made to us by certain representatives of the village oilseeds crushing industry that exports of oils and oilseeds should be banned. We have considered this suggestion fully and are unable to endorse it. It would appear from the above figures that exports of oils and oilseeds have not been large. We have been assured that export quotas are released after a careful assessment of the production, consumption and the prices of oils and oilseeds in the

country and that care is taken to keep within the country sufficient quantities of oils and oilseeds. The need for the cultivator to get a fair price is also an important consideration and the quotas are fixed considering the overall position of supply and prices. Export quotas are really for the benefit of the economy of the entire country. The aim is to prevent a too sharp fall or a too sharp rise in the prices and the interests of both the producers and consumers are kept in view. Any attempt to maintain the prices of oils and oilseeds at suitable levels is really a contribution towards the stabilisation of the economy of the entire country. There is usually a sympathetic movement of prices of all the commodities. We are, therefore, unable to accept the suggestion that export of oils and oilseeds should be banned. We are of the view that if it is necessary to release small quantities of oils and oilseeds to maintain prices in the country, these should be allowed.

13. We have been told that the policy is to allow the export of oils rather than oilseeds so that there should be work for the milling industry. We commend this policy. Certain representatives of the milling industry have pressed us to recommend liberal exports of oilcakes. The reason is that the importing countries are interested not only in our oils but also in our cakes and that it would be a great help to the milling industry if oilcakes were also allowed to be exported as there was considerable demand for oilcakes in the foreign countries. We consider that there is a great need for oilcakes in India as well chiefly for the use of the Indian cattle and also for use as manures and fertilizers. We are, therefore, not in favour of large quantities of oilcakes being exported from India but we have no objection to small quantities of de-oiled cakes, produced by mills being allowed to be exported after allowing for the needs of the country.

14. We have recommended in a previous chapter of this report that the mill sector should produce Sesamum oil only for the use of Vanaspati and other industries and should also meet the requirements, if any, for export purposes. Our exports of Sesamum oil have been small. In the three years 1952-53, 1953-54 and 1954-55, they were less than a ton each year, but if the offtake for export purposes increases and if it is considered in the interests of the country to allow larger exports, we have no objection to the mill sector supplying these requirements.

CHAPTER VII

CESS ON OILS AND OILSEEDS

There is, at the present moment, a cess of one anna per maund on all oils extracted from oilseeds crushed in any mill. There is also a cess at the rate of annas 0-2-0 per maund on all oilseeds exported from India. These cesses have been imposed under Act No. IX of 1946 (The Indian Central Oilseeds Committee Act). The proceeds from these cesses are used for financing the activities of the Indian Central Oilseeds Committee.

2. The income of the Committee from these cesses is about Rs. 15 lakhs per year. There is also a cess of annas 0-4-0 per cwt. of copra crushed in any mill. The income from this cess is normally Rs. 7 lakhs per year.

3. In the questionnaire issued by us to the State Governments, the All-India State Organisations of Oil Millers, the Chambers of Commerce & Industry and other concerned, we specifically asked whether there was a case for an increase in the existing cesses. As was to be expected, the representatives of the milling industry vigorously opposed any suggestion to increase the cess. The representatives of the village industry were equally strongly of the view that the existing cess should be substantially increased. Some of the State Governments have opposed the suggestion to increase cess, others have recommended a small increase while others have recommended a substantial increase.

4. According to a very reliable estimate, the comparative cost of production by mills and ghanis is on an average as under:—

| | | |
|--------|----|-----------------------------------|
| Ghanis | .. | Rs. 9 to Rs. 11 per maund of oil. |
| Mills | .. | Rs. 5 to Rs. 7 per maund of oil. |

According to the Committee for the Protection of the Village Oil Industry, Bombay State (1948), the margin between the crushing cost in respect of a ghani and a mill is roughly about 12 pies per lb. of oil.

The lowest crushing cost in respect of mills is 4.1 pies and the highest 8.5 pies per lb. of oil. Similarly for a ghani the lowest cost for crushing is 15 pies and the highest is 22 pies per lb. of oil. We consider that the difference between the costs of production of oil by mills and ghanis is about Rs. 4 to Rs. 5 per maund, that is, the production of oil through mills is cheaper to this extent. There is,

therefore, a case for a reasonable amount of cess or excise on vegetable oils produced by mills. That the proceeds from this cess or excise should be earmarked wholly for the benefit of the village oil industry, is a point with which we are unable to agree. In this connection we would like to refer to the recommendations of the Taxation Enquiry Commission on the subject of earmarking of tax receipts. To quote the Commission:

“Differentiation between organised and unorganised industry is being introduced in the levy of an increasing number of excise duties. This, we think, is justified for reasons which are stated in the chapter on excise duties in Vol. II of the report. Over and above such differentiation (or within it), to link a specific burden on a segment of industry with benefit to another segment does not seem a wholesome practice as it detracts from the unified administration of public finances.”

5. We are of the view that any cess on the organised industry for the ostensible purpose of assisting the unorganised sector of the same industry would be a perpetual irritant and we are, therefore, unable to recommend the levy of any cess on the vegetable oilseeds-milling industry for utilising the proceeds for the benefit of the ghani. We further consider that the expenses of rehabilitating and assisting the ghani industry may really be greater than the proceeds from the cess on the mill oil and it would be most unfair to the village industry if the expenditure on its rehabilitation were confined only to the income from the cess on the mills. We recommend that there should only be an excise duty on mill oil and that the income from this excise should enter the General Revenue.

Any money required for the benefit of the village industry should come from the General Revenues and this need not be equal to the amount of income from the excise duty. The expenditure on the village industry should be according to its requirements and if it exceeds the income from the excise duty, this need cause no concern to Government. We consider that it is the duty of Government to assist the village oilseeds crushing industry irrespective of the amount of excise duty that may be collected from the mills. Regarding the rate of excise duty, we refrain from making any recommendation as just when we were about to finalize this Report, the Government of India in their budget proposals for the year 1956-57 presented to Parliament, announced a proposal to levy an excise duty of Rs. 2-8-0 per maund on vegetable oils produced in power mills.

CHAPTER VIII

ASSISTANCE TO THE VILLAGE OILSEEDS CRUSHING INDUSTRY

We have recommended in a previous chapter of this Report that except for the requirements of exports and the industries dependent upon the vegetable oil industries, crushing of Sesamum seed should be reserved for crushing by village ghanis only. We do not think that this is adequate assistance for the ghani industry and there is need for assistance to this industry in various other directions.

2. We have mentioned already that the ghanis used in this country are highly antiquated. It is also a fact that extraction of oil from these ghanis is lower than the extraction of oil from the mills. We have emphasised that on account of the employment possibilities of the village ghani industry, there is need for giving every possible encouragement to this industry. The most important item of assistance to the industry is the replacement of the old type ghani by the improved type ghani. The most important of the improved types is what is popularly called the Wardha Ghani. We understand there are a couple of other improved types also, one of them being the ghani being popularised by the Bombay Government, namely, the Nutan Ghani. Some work has been done by the Indian Central Oilseeds Committee and the All India Khadi and Village Industries Board in the popularisation of the Wardha Ghani but we must say that the work so far done is small compared to the magnitude of the problem. As stated by us in a previous chapter, the total number of ghanis in existence according to the Livestock Census of 1951 is 4,46,436. We consider that it would be a stupendous task to replace every one of these ghanis but this task has to be undertaken. We recommend that at least 10,000 improved ghanis should be supplied annually on a subsidised basis to the village oilmen to replace the old type of ghanis.

In our view this figure should be treated as the minimum and if it is possible to replace a large number of old type ghanis by the improved ghanis, this should be welcome.

3. At the present moment, the All-India Khadi and Village Industries Board are subsidising the supply of improved type ghanis to the extent of Rs. 150 per ghani. This rate of subsidy may be continued.

4. We have considered whether the improved ghanis should be supplied at a subsidised rate only to the existing oilmen or they should also be supplied to any body who is prepared to instal and run an improved ghani. We consider that the subsidy for the installation of the improved type of ghanis may be given to any body irrespective of whether he is a hereditary oilman or is a new entrant to the profession.

5. While the Wardha Ghani is an improvement on the old type ghani, we do not think it is a model of perfection and research should be organised at a few selected centres in the country for effecting improvements in the Wardha Ghani so that it can extract a larger percentage of oil from a given quantity of oilseeds. We understand the Indian Central Oilseeds Committee is setting up a Village Oil Industry Training and Research Centre. The All-India Khadi and Village Industries Board have already set up a Research Centre for the same purpose. We consider that these are steps in the right direction and that there is need for continuous research on effecting improvement in the village ghani.

6. Our enquiries indicate that most of the existing ghanis do not work whole-time. One of the reasons for this state of affairs is lack of continuous supply of raw materials to the village oilmen. They have no funds to stock oilseeds soon after the harvesting when the prices are not very high and it is vital that credit should be provided to them for stocking of oilseeds. Further it is essential that a market for the oils and cakes produced by the oilmen should be guaranteed. It is our view that the entire programme of assistance to the village ghani could be defeated if adequate marketing arrangements do not exist for ghani oil and cake. In the circumstances, we recommend the organization of a net-work of Oilmen's Co-operative Societies whose chief duty should be to ensure a continuous supply of raw material to the oilmen and to buy all the oils and oilcakes produced by them, as only a rapid sale of the oils and oilcakes could keep the ghanis going.

7. We understand liberal provision is being made in the second Five Year Plan for assistance to Co-operative Institutions in the country, and we hope it will be possible for the Co-operative Societies of oilmen to have sufficient financial resources for undertaking the twin duties of supplying the raw material to the oilmen and purchasing the oils and cakes produced from this raw material.

8. If the Co-operative Societies do not have sufficient finances to discharge this responsibility, we would suggest consideration of the

possibility of setting up marketing organizations in each State which could be entrusted with the duty of supplying raw material to the oilmen and purchasing the oils and cakes produced by them.

9. Elsewhere in this report we have referred to the demand for the reservation of edible oilseeds for crushing by the ghanis only. One reason for this demand is the uncertainty of the supply of oilseeds. There is the further complication on account of oilseeds being subject to fluctuations in prices. That is the main reason why the oilmen cannot raise finance on the security of the oilseeds. Till a marketing organisation, as suggested in the previous paragraphs, is organised in a State, we feel that Government should come forward and remove the difficulty experienced by the oilmen and the co-operative societies in arranging finances.

We understand that mainly due to the oilseeds prices being subject to fluctuations, credit is not easy to arrange. We feel that the State should guarantee the losses to enable the oilmen to hold out at the time of fall in prices. We do not think that this is likely to be an item of recurring expenditure on any appreciable scale as steps will, no doubt, be taken by Government to prevent violent fluctuations in prices in the interests of the general economy of the country. In any case, whatever payment Government may have to make on this account, should be treated as a loan to the co-operative societies. There are fluctuations both ways and in the normal course, the loss of one season may be made up by profits of the next. It should not, therefore, be difficult for the societies to repay the loan within a short period. There may be exceptional cases where the loan may have to be written off. Similar facilities may have to be given to the marketing organisations that may be set up in various States.

10. The marketing organisations referred to above will presumably be under the control of the All-India Khadi and Village Industries Board.

11. The All-India Khadi and Village Industries Board is at the present moment granting a production subsidy of Rs. 2-8-0 per maund of oil produced by the ghanis. We have considered whether the subsidy should be continued in view of the proposal of the Government of India to levy an excise duty of Rs. 2-8-0 per maund on vegetable oils. But in view of the fact that this excise duty is leviable only on power-operated units producing more than 125 tons of oil and also because even such units will not pay any excise duty on their production upto 125 tons cleared for home consumption, it

is essential to continue to subsidize the production of ghani oil. We consider that a subsidy of Rs. 1-14-0 instead of the existing rate of Rs. 2-8-0 would be adequate.

12. The representatives of village oilseeds crushing industry have asked us to recommend that only ghani oil and cakes should be purchased to meet the requirements of Government for use in hospitals, jails, police establishments, messes, hostels etc. etc. We recommend that orders should be passed for the purchase of ghani oils only for the requirements of Government. This would be a great assistance to the village oilseeds crushing industry. Regarding ghani cakes, we are unable to recommend that the use of ghani cake in Government institutions should be mandatory. The keeping quality of ghani cakes is inferior to the keeping quality of mill cakes and it would not, therefore, be proper to make its use compulsory for Government institutions especially where the cakes have to store for comparatively long periods. But in the case of oilcake, required by Government institutions for immediate consumption, we would recommend that purchases should be confined to cakes produced by ghanis only. In so far as the use of oil cakes in the villages is concerned, we have already stated that there is not likely to be much deterioration in storage for the simple reason that long storage is generally not necessary in the villages, the cakes being consumed within a short time.

13. It has been suggested to us that ghani oil should enjoy a freight concession as compared to the mill oil when moved by railways. We have examined that suggestion but are unable to commend it in view of the practical difficulty in distinguishing ghani oil from mill oil and the danger of mill oil being passed as ghani oil for this purpose. But there will be no such danger in the case of movement of ghanis and we recommend that the railways should sanction a concessional rate for the movement of ghanis and allied equipment.

CHAPTER IX

ORGANISATION FOR CONTROL OF OILSEEDS CRUSHING INDUSTRY

We have recommended in a previous chapter of this report that there should be no further increase in the installed crushing capacity of the vegetable oil mills. In other words, we are averse to any new mills being installed for crushing oilseeds in any part of the country. We have also recommended that, except for the requirements of exports and the industries dependent upon vegetable oils, the crushing of sesamum seed should be reserved for ghani only.

2. We consider that there will be need for central legislation to carry out these recommendations. It is a fact that the Industries (Development and Regulation) Act, 1951 (No. LXV of 1951) applies also to the vegetable oil industry but this Act covers only the oil mills which crush oilseeds with the aid of power and employ at least 50 persons or which crush oilseeds without the aid of power and employ at least 100 persons. In view of the fact that only a small proportion of the oil mills are covered by this Act, there is need for separate legislation to carry out our recommendations. We recommend that this legislation should provide for the creation of a statutory office of a Controller of the Vegetable Oilseeds Crushing Industry who should be entrusted with the duty of seeing that no new mills are set up for crushing oilseeds, that the existing installed crushing capacity of the mills is not exceeded and that the crushing of sesamum by the mills is not undertaken except for the requirements of exports and industries dependent using vegetable oils as a raw material. There may be regional officers, working under the Controller of the Vegetable Oilseeds Crushing Industry in the various States who can be delegated suitable powers.

3. There is one aspect of the oil milling industry to which we would like to draw attention of all concerned. We came across in our personal visits to certain oil mills hand presses for the crushing of certain oilseeds. The extraction of oil through these hand presses involved a considerable amount of cruelty to the workmen and we are of the opinion that these hand presses may be replaced by power-driven mills with the crushing capacity equal to that of the hand presses and that if any financial assistance in the shape of loans or grants to the owners of these hand presses is necessary, this should

be given by Government. The duty of gradual replacement of these hand presses may also be entrusted to the Controller of the Oilseeds Crushing Industry.

4. We are also satisfied that there is a considerable need for technical advice being given to the mills. The growth of the milling industry has been most haphazard. Most of the mills are run inefficiently by persons without possessing technical knowledge of the processes involved and in general are organised to crush a single type of seed, though some mills do crush more than one seed. The result is that many of them work only as long as a particular seed is available and then remain idle. The equipment used in many cases is old and badly maintained. We consider that subject to the installed crushing capacity of the mills not being raised, there is need for technical advice being given to the mill sector regarding the type of machinery to be used, the manner of maintaining it, the treatment of seed before crushing, the storage of oilseeds etc. etc. The duty of giving technical advice could appropriately be entrusted to the Indian Central Oilseeds Committee.

5. It has been suggested to us that there is need for setting up a Central Research Laboratory for carrying out research on oilseeds crushing techniques and equipment. We understand that the setting up of a Central Institute of Oil Technology is already included in the Second Five Year Plan.

6. Our visits to the mills also convinced us that there was need for Governmental measures to ensure healthful conditions of work for the workmen. The members of the Committee were unable to stand for more than 5 minutes near certain power-driven rotaries crushing Mustard, because the atmosphere was surcharged with pungency and it was surprising that the workmen were going about without any protection for their eyes. The Controller of the Industry could also be entrusted with the duty of ensuring minimum amenities for the workmen employed in the oil milling industry.

7. At the present moment, the work regarding the development of the Village Oilseeds Crushing Industry is being done by the Indian Central Oilseeds Committee and by the All India Khadi and Village Industries Board. We have considered whether it would not be desirable to entrust the work to a single agency and have come to the conclusion that while the All India Khadi and Village Industries Board may be entrusted with the work of development of the Village Oilseeds Crushing Industry, the Indian Central Oilseeds Committee

52 C.P.—3.

also may continue to do this work to the extent its resources permit this. We have mentioned already that the income of the Indian Central Oilseeds Committee is about Rs. 15 lakhs per year. The development of the Village Oilseeds Crushing Industry is only one of its many functions and the Committee cannot be expected to devote a large part of its resources to the development of the ghani industry. But the Committee is a useful forum for a discussion, amongst other things, of all aspects of the Oilseeds Crushing Industry (both its organised and unorganised sectors) and if the Indian Central Oilseeds Committee continues to organise assistance to the Village Oilseeds Crushing Industry, however small this assistance might be, it will continue to have firsthand experience of this type of work and this will help the Committee in giving useful advice to Government and others concerned on the various problems that may confront the industry from time to time. Further, as stated by us already, the task of rehabilitation of the Village Oilseeds Crushing Industry is a stupendous one and there is room for more than one organisation for doing the work.



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CHAPTER X

MINOR OILSEEDS

We have mentioned elsewhere in this Report that there is a serious paucity of reliable statistics about the various aspects of the Oilseeds Crushing Industry. We found that reliable statistics did not exist also about the production of what are called 'Minor Oilseeds'. These minor oilseeds are Niger, Safflower (Kardi), Mohuwa, Tobacco-seed, Neem, Karanji, Poppy, San and Ambadi etc. Actually though Niger and Kardi are classified as minor oilseeds, it is a misnomer to describe them as minor oilseed, as their production is considerable. There is no regular arrangement for the collection of statistics of production of these oilseeds and there is a widespread belief that exploitation of the minor oilseeds could add greatly to the oil resources of the country. While we have no doubt that the fullest exploitation of these oilseeds could certainly add to the oil resources of the country, we do not believe that just because statistics about the production of these oilseeds do not exist, these oilseeds are not utilised in the countryside. We believe that local populations do collect these oilseeds in some quantities and utilise them for various purposes. We are also satisfied that collection of such minor oilseeds as grow naturally, could be stepped up for the benefit of all concerned. We recommend that village level workers in the National Extension Service Blocks and the Community Project Areas should be told to popularise the collection of minor oilseeds where they grow in natural state so that their exploitation may be a source of income to the rural population and may incidentally add to the oil resources of the country.

2. The Indian Central Oilseeds Committee has sanctioned schemes of survey of minor oilseeds in a number of States and we hope that these surveys will lead to collection of useful data.

We understand that the oil content of a number of these oilseeds is substantial. Niger seed contains about 35 per cent. of oil by weight. This oil is used for cooking, toilet industry etc. etc. Safflower has an oil content between 25 to 30 per cent. by weight of seed. The oil is used for cooking purposes as well as for waterproofing etc. Mohuwa contains about 33 to 43 per cent. of oil by weight. Tobaccoseed contains about 36 per cent., Neem about 33 per cent. and Karanji about

28 per cent. by weight of seed. We would also recommend that after the Indian Central Oilseeds Committee has completed its survey of minor oilseeds in the various parts of the country, the possibility of making arrangements for regular collection and publication of statistics of production of minor oilseeds may be examined.

3. Rough figures of production of these minor oilseeds in some of the States are given in Appendix 'M', attached to this Report. We would like to emphasise that these estimates are very rough and do not cover the entire country.



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CHAPTER XI

DEVELOPMENT OF COTTONSEED CRUSHING INDUSTRY

The production of cottonseed in India during the year 1954-55 was about 15 lakh tons. The quantity of cottonseed crushed in power-driven mills during that year was 56,687 tons. No cottonseed is crushed through ghanis.

2. Suggestions have been made to us that all possible assistance should be given to the Power Cottonseed Crushing Industry. Curiously enough, these suggestions have mostly come from the protagonists of the village ghanis. We have also received suggestions from some cottonseed crushing mills that cottonseed crushing by mills should be encouraged by a reduction in the railway freight on the movement of cottonseed. Other mills have suggested that the railway freight on cottonseed should be increased so that it should be crushed where it is produced. These suggestions have apparently been motivated by the interests of the individual mills concerned. It has also been suggested that these mills should be given financial assistance in the purchase of plant and machinery and should be allowed to import plant and machinery without payment of custom duties. Representations have been made to us that there is a lot of wealth hidden in the cottonseed, that it can add to the oil resources of the country and that it can produce linters in considerable quantities which can be used in the rayon industry. We have given the fullest possible considerations to these suggestions.

3. The production of oil from the cottonseed during the year 1954-55 was only 6,934 tons against a quantity of 56,687 tons of cottonseed crushed. This gives a rate of extraction of 12 per cent. of oil only which is about one third of the quantity of oil produced from the same quantity of some of the more important vegetable oilseeds. While the crushing, therefore, of the entire quantity of cottonseed produced in the country would certainly add to the oil resources of the country, the extent of these resources is exaggerated.

Against this we have to consider the effect of a large scale resort to the crushing of cottonseed on the general economy of the country. In this connection, we have had the benefit of the views of some leading animal husbandry and cattle utilisation workers in the country and they have told us in emphatic terms that the country must go slow in the matter of encouragement of cottonseed crushing by mills.

4. We have referred in a previous chapter of this report to the views of the National Cottonseed Products Association of the U.S.A. We have been told by the Association that the cottonseed cake or meal that has been processed mechanically and contains from 3.5 per cent. to 5.5 per cent. of oil commands a higher price while that which has been solvent extracted and contains very little oil commands a lower price. We have also referred to the fact that in a certain American market, there was a difference of 2 dollars per ton between two types of cakes or meal. That Association have further told us that the difference in prices does not appear related to difference in nutritive value and that repeated experiments at a number of colleges in America have shown no significant nutritional difference between the two types of cakes or meal. We have been further told that the types containing a higher percentage of fat would of course furnish the animal with a somewhat greater number of calories. In our view the same argument would apply to the difference between cottonseed and cottonseed cakes in general.

5. Experiments have been conducted at the Indian Veterinary Research Institute on the effect on cattle of feeding them with cottonseed, cottonseed cake and dairy mixture. These experiments have shown that the digestibility of ether extract was highest in the case of cottonseed, next highest in the case of cottonseed cake and lowest in the case of dairy mixture.

The digestibility of crude protein and total carbohydrates did not show any particular difference in all the cases. Data on milk yield and fat production of three types of feeding showed an actual but not a significant increase in total fat production in cottonseed group as compared to the other two feed groups, whereas values for milk yield and fat corrected milk were lowest for cottonseed group and highest for cottonseed cake group. The differences were not significant. Full details of the experiments conducted are given in Appendix 'R' attached to this report.

6. Incidentally, these experiments did not include buffaloes which are known to utilise cottonseed better for increased production of fat in their milk. The experiments at the Indian Veterinary Research Institute have been based on such animals as were fed on scientifically balanced rations and the animals got other concentrates in their diet besides cottonseed or cottonseed cake and it would be undesirable to conclude from these experiments that it did not make much difference to feed the Indian cattle on cottonseed or cottonseed cake. We have stated elsewhere in this report that the

Indian cattle in general are very ill-fed and that an additional quantity of oil in their rations which cottonseed would give them would greatly enhance the calorific value of the feed for generating the required energy. In a balanced ration such energy can be obtained by the animals by other concentrates present in the ration, while in the case of ill-fed cattle with practically no other grain ration, the presence of an extra quantity of oil in the cottonseed would be a distinct advantage. We, therefore, recommend, considering all the circumstances of the case, that we should go slow in the matter of development of cottonseed crushing by mills. Incidentally, the Indian cattle owners have a preference for cottonseed from times immemorial and even if certain interests in the country want a rapid development of the cottonseed crushing by mills, this development cannot but be slow in view of the preference for cottonseed on the part of the cattle owners. We have mentioned that in the year 1954-55, 56,687 tons of cottonseed was crushed against a total production of 15 lakh tons of cottonseed in the country. This works out to nearly 4 per cent. of the total cottonseed produced. We recommend that during the Second Five Year Plan the quantity of cottonseed crushed in the country should not exceed 20 per cent. of the total production of cottonseed.

7. We have recommended in a previous chapter of this report the enactment of suitable legislation to control the Oilseeds Crushing Industry. This legislation should also provide for the control of the Cottonseed Crushing Industry and as recommended above, we have no objection to the crushing capacity of the Cottonseed Crushing Industry being increased from the existing 4 per cent. to about 20 per cent. of the cottonseed produced in the country.

8. As regards special assistance to the Cottonseed Crushing Industry, it is a fact that some additional machinery is required for crushing cottonseed as compared to other seeds particularly in view of the need for refining the initial crude product obtained from the seed. But we have reasons to believe that such mills as are crushing cottonseed at the present moment are not running at a loss. It is a fact that the initial expenditure for setting up modern cottonseed crushing mills is higher than that for setting up mills for crushing other oilseeds. It is also a fact that extraction of oil from cottonseed is lower than from other oilseeds, but compared to other oilseeds, cottonseed is very much cheaper and, on the whole, we do not see any reason why any special concession should be given to the cottonseed industry. It is not that we want to hamper the growth of this

industry, but there is a real danger that if direct or indirect subsidies are given to this industry, the consequential large scale diversion of cottonseed from Indian villages to the urban areas for crushing by mills might have a dangerous effect on the health of the Indian cattle. We would recommend, however, that licences for import of machinery for crushing cottonseed might be given freely upto the limit of crushing capacity indicated above, if there is a demand for such licences. Appendix 'N' attached to this report gives the results of certain experiments on the crushing of cottonseed at the Institute of Oil Technology, Anantapur (Andhra).



CHAPTER XII

ACKNOWLEDGEMENTS

The Committee are grateful to Shri P. A. Gopalkrishnan, I.C.S., Joint Secretary to the Government of India in the Ministry of Food and Agriculture, who presided over the work of the Committee upto November, 1955, for giving very valuable assistance in the initial stages of the Committee's work.

2. The Committee are also grateful to the Secretary, Indian Central Oilseeds Committee, Hyderabad, for providing valuable data for the work of the Committee.

3. The Committee are also grateful to Shri Om Prakash Gupta, Oilseeds Specialist, Uttar Pradesh Government and Shri L. C. Gupta, Joint Director of Cottage Industries, Uttar Pradesh Government, who gave valuable assistance in the work of the Committee while the Committee was visiting mills and ghanis at Kanpur.

4. The Committee are also grateful to the State Governments and numerous associations of oil millers and the Chambers of Commerce and Industry who gave benefit of their views on the various problems considered by the Committee.

5. In the end, the Committee wish to place on record their appreciation of the work done by the Secretary of the Committee, Shri F. C. Gera, Under Secretary, Ministry of Food and Agriculture. The thoroughness, diligence and ability which he brought to bear on this work was a great help to the Committee.

T. C. PURI, I.C.S.,
Chairman.

R. L. MEHTA, I.A.S.,
Member.

P. JOHARI, MRS.,
Member.

JHAVERBHAI PATEL,
Member.

Signed subject to a note attached.
RATILAL M. GANDHI,
Member.

Signed subject to the note Dissent
attached herewith.
SATISH CHANDRA DASS GUPTA,
Member.

Signed subject to a note attached.
K. S. MURTI,
Member.

Signatures of Shri Ratilal M. Gandhi and
Dr. K. S. Murti, who have signed on
separate copies of the report, attested.

F. C. GERA,
Under Secretary
to the Govt. of India,
Ministry of Food & Agriculture.

CHAPTER XII-A

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

1. There is a marked preference in the country for the ghani oil over the mill oil so far as domestic consumption is concerned. Ghani oil is more palatable than mill oil and according to popular opinion, it is slightly more nutritious than mill oil.

2. There is every justification for ensuring that ghani oil unadulterated with mill oil is made available to the consumers for domestic consumption in the quantities required by them.

3. Filtration of ghani oil should be encouraged on a large scale.

4. In the conditions prevailing in India where malnutrition of animals is the rule and their balanced feeding an exception, it is important that they are fed on oilcakes containing a higher percentage of oil.

5. One result of crushing of oilseeds by ghani is that the cake remains in the villages and is fed to the cattle.

6. Ghani pressed cake undergoes quicker spoilage but ghani cakes produced in small quantities by village oilmen are easily sold and there is little danger of the ghani cake being spoiled by long storage for the reason that this will not be stored for a long time.

7. Vanaspati industry, the paints and varnishes industry and the Soap factories may continue to draw their requirements of vegetable oil from the existing sources, namely, the vegetable oil mills.

8. If the pharmaceutical industry needs any quantity of vegetable oils from the mill sector, there is no objection to that sector continuing to meet the requirements of that industry.

9. Ghani has superior employment possibilities compared to the mills and there is a case for giving every possible encouragement to it even if it means a slight loss of the total vegetable oil resources of the country.

10. The existing number of ghanis will not be able to cope with the crushing of all the edible oilseeds produced in the country. The suggestion to reserve all edible oilseeds for crushing by ghanis is, therefore, impracticable.

11. While encouragement should be given to the ghanis, oil milling industry is also entitled to a place in India's economy.

12. Installed crushing capacity of the milling industry may be allowed to operate in respect of all oilseeds except Sesamum. Regarding Sesamum, the mill sector may continue to supply Sesamum oil for the requirements of the vanaspati and other industries and for exports. All requirements of Sesamum oil for domestic consumption should be met by the ghanis.

13. No more power-driven mills should be set up in the country.

14. It is not desirable to ban the exports of oils and oilseeds. If it is necessary to export small quantities of oils and oilseeds to maintain prices in the country, these should be allowed.

15. It is not desirable to permit export of large quantities of oilcakes, but there is no objection to small quantities of de-oiled cakes produced by mills being allowed to be exported after allowing for the needs of the country.

16. There should only be an excise duty on mill oil and this excise should enter the General Revenues.

17. It would not be desirable to levy a cess on the oil mills for utilizing the proceeds for the benefit of the ghani. Any money required for the benefit of the village industry should come from the General Revenues and this need not be equal to the amount of income from the excise duty. The expenditure on the village industry should be according to its requirements.

18. At least 10,000 improved ghanis should be supplied annually on a subsidized basis to the village oilmen to replace the old type ghanis.

19. Supply of improved type ghanis should continue to be subsidized at Rs. 150 per ghani.

20. Research should be arranged at a few selected centres for effecting improvements in the Wardha Ghani.

21. It is desirable to have a net work of oilmen's co-operative societies whose chief duty should be to ensure a continuous supply of raw material to the oilmen and to buy all the oils and oilcakes produced by them, as only a rapid sale of the oils and oilcakes could keep the ghanis going. If the co-operative societies do not have

sufficient finances to discharge this responsibility, it would be desirable to consider the possibility of setting up marketing organisations in each State for doing this work.

22. Government should remove the difficulties experienced by the oilmen and Co-operative Societies in arranging finances. Mainly due to the oilseeds' prices being subject to fluctuations, credit is not easy to arrange and the State should, therefore, guarantee the losses to enable the oilmen to hold out at the time of fall in prices. Whatever payment Government may have to make on this account should be treated as a loan to the Co-operative Societies. In the usual course, the loss of one season could be made up by the profits of the next. In exceptional cases, the loan may be written off.

23. The production subsidy of Rs. 2-8-0 per maund of oil produced by the ghanis should be reduced to Re. 1-14-0 per maund.

24. Government's requirements of vegetable oils for use in hospitals, Jails, Police Establishments, messes, hostels etc. should be met by the purchase of ghani oil only.

25. Purchases of oilcakes required for immediate consumption in Government institutions should be confined to ghani cakes only. The keeping quality of ghani cakes is inferior to the keeping quality of mill cakes and it would not, therefore, be proper to make the use of ghani cakes compulsory where the cakes have to be stored for long periods.

26. Railways should sanction a concessional rate of freight for the movement of ghanis and allied equipment.

27. There is need for technical advice being given to the mill sector regarding the type of machinery to be used, the manner of maintaining it, the treatment of seed before crushing, the storage of oilseeds etc. The duty of giving this advice could be entrusted to the Indian Central Oilseeds Committee.

28. There is need for Governmental measures to ensure healthful conditions of work for the workmen employed in the mills.

29. Village-level workers in the National Extension Service Blocks and the Community Project Areas should be told to popularise the collection of minor oilseeds where they grow in natural state so that their exploitation may be a source of income to the rural population and may incidentally add to the oil resources of this country.

30. The Indian Central Oilseeds Committee is engaged in a survey of minor oilseeds in the country. After this survey is completed, the possibility of making arrangements for regular collection and publication of statistics of production of minor oilseeds may be examined.

31. The country should go slow in the matter of development of cottonseed crushing by mills. During the Second Five Year Plan the quantity of cottonseed crushed in the country should not exceed 20 per cent. of the total production of cottonseed.

32. There is no reason why any special concession should be given to the cottonseed industry. There is a real danger that if direct or indirect subsidies are given to this industry, the consequential large-scale diversion of cottonseed from Indian villages to the urban areas for crushing by mills might have a dangerous effect on the health of the Indian cattle. However, licences for import of machinery for crushing cottonseed might be given freely upto the limit of crushing capacity indicated above.

33. Hand presses used for the crushing of certain oilseeds involve a considerable amount of cruelty to the workmen and these presses may be replaced by power-driven mills with the crushing capacity equal to that of the presses. If any financial assistance in the shape of loans and grants to the owners of these presses is necessary, this should be given by Government.

34. There is need for separate Central legislation to carry out the recommendations of the Oilseeds Crushing Industry Inquiry Committee. This legislation should provide for the creation of a statutory office of a Controller of the Vegetable Oilseeds Crushing Industry who should be entrusted with the duty of seeing that no new mills are set up for crushing oilseeds, that the existing installed capacity of the mills is not exceeded and that the crushing of Sesamum by the mills is not undertaken except for requirements of exports and industries using vegetable oils as a raw material. There may be regional officers working under the Controller of the Vegetable Oilseeds Crushing Industry in the various States who can be delegated suitable powers.

APPENDIX A

No. F. 5-53/54-Com. I.

GOVERNMENT OF INDIA

MINISTRY OF FOOD AND AGRICULTURE (AGRI.)

New Delhi, the 4th January, 1955.

RESOLUTION

In the first Five Year Plan, Planning Commission attached great importance to the development of the Village Oil Industry and suggested *inter alia* the adoption of a policy of developing the production of edible oils through village oil industry and that of non-edible oils through oil mills. The Commission also recommended that further expansion of the large scale industry should not ordinarily be permitted in the sphere of food processing industries and that a small cess should be levied on mill oil for the benefit of the Village Oil Industry.

2. The Government of India have now decided to appoint a Committee to go into the entire question of the Oilseeds Crushing Industry in India, the term 'Industry' including crushing both by village ghanis and by mills. The Committee will consist of the following members:—

Chairman

1. Shri P. A. Gopalkrishnan, I.C.S., Joint Secretary, Ministry of Food and Agriculture.

Members

2. Shri Rati Lal M. Gandhi, Vice-President, Indian Central Oilseeds Committee.
3. Shri Jhaverbhai Patel, Officer on Special Duty, Planning Commission.
4. Shri R. L. Mehta, I.A.S., Deputy Secretary, Ministry of Food and Agriculture.
5. Shri Satish Chandra Das Gupta, Khadi Pratishthan, Sodepore (Calcutta).
6. Deputy Secretary in-charge of Cottage Industries, Ministry of Commerce and Industry (by designation).

7. Dr. K. S. Murti, Officer-in-charge of the Institute of Oil Technology, Anantapur, Andhra.

Secretary

8. Shri F. C. Gera, Under Secretary, Ministry of Food and Agriculture.

3. The terms of reference of the Committee will be as follows:—

To carry out a rapid survey of the state of Oilseeds Crushing Industry (crushing both by mills and by village ghanis) in the country and to recommend the lines on which this Industry should be developed in future; in particular, to examine and report:

- (a) whether it is necessary to increase or to reduce the existing oilseed crushing capacity of mills in the country;
- (b) whether it would be desirable to reserve any particular oilseeds for crushing by the village ghani only having regard to the effect of such reservation on the efficiency of production of oil and its nutritional value and having regard further to its effect on employment, supply of oil to consuming industries and exports;
- (c) whether it is necessary to give any assistance to the Village Oilseeds Crushing Industry and if so, in what form.

4. The Committee will complete its work within a period of 6 months.

Ordered that a copy of the Resolution may be communicated to all State Governments, all Ministries and Departments of the Government of India, Cabinet Secretariat, Prime Minister's Secretariat, Parliament Secretariat and Planning Commission.

Ordered also that the Resolution be published in the Gazette of India.

(Sd.) P. N. THAPAR,
Secy. to the Govt. of India,
Ministry of Food & Agriculture.

Copy to:—

- (1) All Subordinate and Attached Offices of the Ministry of Food and Agriculture.
- (2) Chairman and Members of the Oilseeds Crushing Industry Inquiry Committee.
- (3) All Administrative Sections.

- (6) Administration Co-ordination Section (6 copies).

By orders, etc.,

Dy. Secy. to the Govt. of India.



सत्यमेव जयते

APPENDIX B

MINISTRY OF FOOD AND AGRICULTURE (Oilseeds Crushing Industry Inquiry Committee)

QUESTIONNAIRE TO THE SECRETARIES TO THE STATE GOVERNMENTS DEPARTMENT OF INDUSTRIES.

[For purposes of this questionnaire, oilseeds mean Groundnut, Sesamum, Rape and Mustard, Castor, Linseed, Cottonseed and minor oilseeds (Tobacco, Kardi, Niger, Neem, Mohuwa.)]

1. What is the quantity of oilseeds produced annually in your State? (Please give figures by various oilseeds).
2. How much of this quantity is crushed in the State? (Please give figures by various oilseeds).
3. How is the quantity not crushed used? (Please give figures by various oilseeds).
4. What is the quantity of oilseeds crushed by power mills? (Please give figures by various oilseeds).
5. What is the quantity of oilseeds crushed by village Ghanis? (Please give figures by various oils).
6. What is the quantity of oil produced by power mills? (Please give figures by various oils).
7. What is the quantity of oil produced by village ghanis? (Please give figures by various oils).
8. What is the number of vegetable oil mills in your State?
9. What is the oilseeds crushing capacity of these mills?
10. Is this capacity fully utilised? if not, what is the capacity not utilized?
11. What is the number of persons employed in the power mills? [Please give figures separately for (i) skilled and (ii) unskilled categories. What are their average daily wages?]
12. How many persons could be employed in these mills if they were run to capacity?

13. What is the number of village ghanis in your State and what is their crushing capacity?

14. Are these village ghanis occupied throughout the year? If not, how long are these ghanis occupied?

15. Please state: (a) the number of oilmen and (b) the number of bullocks engaged on one village ghani.

16. If the village oilmen are not engaged on operating the ghanis throughout the year, what are their subsidiary occupations?

17. What are the causes for the village ghani not being used by oilmen throughout the year?

18. How are the oils produced by power mills used in your State? Please give figures under the following heads:

- (a) Edible purposes. (b) Conversion into Vanaspati. (c) Used for paints and varnishes. (d) Used in the manufacture of soap. (e) Used in the manufacture of biscuits. (f) Used by tanning industries. (g) Used by woollen mills. (h) Used by textile mills. (i) Used by Chemical, Pharmaceutical and toilet industries. (j) Used for lubrication. (k) Miscellaneous uses.

19. How are the oils produced by village ghanis used in your State? Please give figures under the heads mentioned in the preceding question.

20. Please furnish your views on the question that all edible oils should be produced by ghanis and all non-edible oils should be produced by mills. In particular, please state what the effect of this reservation will be on the efficiency of production of oil, its nutritional value and its effect on employment, supply of oil to consuming industries and exports. Also please state what marketing arrangements would be necessary for marketing of oil produced by ghanis if all edible oils were produced by ghanis.

21. If all edible oils were to be produced by ghanis, is this within the capacity of the existing number of ghanis in your State? If not, how many additional ghanis would require to be installed before they could cope with crushing of all edible oilseeds?

22. What is the percentage of oil produced from oilseeds in case of (a) rotary, (b) expeller, (c) Hydraulic Press and (d) ghanis? Please give figures oil by oil.

23. Have any investigations been carried out in your State regarding the nutritional value of oilcakes produced by ghanis and by power mills. If so, what were the results?

24. Have any investigations been carried out in your State regarding the nutritional value of oilcakes produced by village ghanis and power mills and if so, what were the results?

25. What is the quantity of oilcakes produced in your State? Please give figures separately for mills and ghanis and for various oilseeds.

26. How are these oilcakes used?

27. What is the percentage of production of oilcakes from oilseeds crushed by mills and by ghanis?

28. Have any solvent extraction plants been installed in your State? If so, please give their number and their capacity and the quantity of oils and oilcakes produced by them. Please give figures separately for various oils and oilcakes.

29. What assistance is being given by the State Government to the Village Oilseeds Crushing Industry either directly or through schemes of the Indian Central Oilseeds Committee or through schemes of the All India Khadi and Village Industries Board or other agencies. What economic benefits have accrued to the village oilmen by these schemes? Would you like to cover the whole of your State with these schemes? What would be the extent of finance required for this work? Please give separate figures of recurring and non-recurring expenditure.

30. What concessions are given in your State to village ghanis by way of rebate on sale tax, subsidy, etc.?

31. What assistance would you like to suggest for the Village Oilseeds Crushing Industry and in what form? Please give your recommendations as precisely as possible.

32. What will be the effect of supply of cheap electricity to the rural areas (as a result of completion of multi-purpose projects) on the bullock-driven ghani?

33. There is at the present moment a cess at the rate of one anna per maund on all oils extracted from oilseeds crushed in any mill. This cess is collected by the Indian Central Oilseeds Committee for financing oilseeds schemes. Would you like to recommend an increase in this cess for the sake of utilization of these funds for the benefit of the Village Oilseeds Crushing Industry? If so, to what extent?

34. There is also a cess on all oilseeds exported out of India at the rate of two annas per maund. This cess is also collected by the

Indian Central Oilseeds Committee. Would you like to increase this cess? If so, to what extent? And whether this would injure our export trade?

35. Have any data been collected in your State regarding the cost of production of various oils by mills and by ghanis? If so, this data may kindly be furnished.

36. What is the normal difference between the actual cost of production of oils by mills and the price paid by the ultimate consumer?

37. Work in connection with rehabilitation of or assistance to the Village Oilseeds Crushing Industry is at present being done by the Indian Central Oilseeds Committee and the All-India Khadi and Village Industries Board. Would you suggest setting up of a separate statutory or non-statutory organisation for this work?

38. What controls are exercised in your State in the matter of establishment of new oil mills and under what legislation?

39. What will be the effect of the expiry of the Essential Supplies Act, 1946, on the establishment of new oil mills?

40. What has been the effect of establishment of oil mills on the rural economy. In particular, whether the oils and oil cakes have become scarcer in the villages?

41. What has been the effect of manufacture of 'Vanaspati' on the prices of edible oils and on the rural economy in general.

42. What is the amount of capital invested in the oil milling industry?

43. How many vegetable oil mills in your State are composite concern, i.e., combined with pulse milling, flour milling etc.?

44. What is the cost of crushing one ton of oilseeds by mills? Please give the break up of this cost with various items of expenditure.

45. Do mills crush oilseeds for others also? If so, what are their charges per ton?

46. What is the source of power for the mills? What is the average total power consumption per mill?

47. To what extent does adulteration of edible oils exist in your State and what are the reasons for this? How could such adulteration be eliminated? Please also state the common adulterants used.

48. Any other suggestion you would like to make in the light of terms of reference of this Committee as given in paragraph 3 of the attached Resolution of the Government of India.

APPENDIX C

MINISTRY OF FOOD AND AGRICULTURE

(Oilseeds Crushing Industry Inquiry Committee)

QUESTIONNAIRE TO THE ALL INDIA ORGANISATIONS OF VANASPATI, SOAP, PAINTS, CHEMICAL AND DRUGS MANUFACTURERS, THE INDIAN CENTRAL OILSEEDS COMMITTEE AND THE ALL INDIA KHADI AND VILLAGE INDUSTRIES BOARD.

[For purposes of this questionnaire, Oilseeds mean Groundnut, Sesamum, Rape and Mustard, Castor, Linseed, Cottonseed and Coconut, and minor oilseeds (Tobacco, Kardi, Niger, Neem, Mohuwa.)]

1. What quantities of vegetable oils are used annually in the country in the manufacture of Vanaspati, Soap, Paints and Varnishes and Chemicals and Drugs in India? (Please give figures separately for each oil).

2. Are these oils produced by Ghanis or produced by mills also? Please give figures separately for ghanis and for mills and also separately for each variety of oil.

3. If all edible oils were produced by ghanis and if all non-edible oils were produced by mills, how will it affect the production of Vanaspati, Soap, Paints and Varnishes, and Chemical and Drugs? In particular, will it affect the cost of production of the exports of the manufactured products?

APPENDIX D

MINISTRY OF FOOD AND AGRICULTURE

(Oilseeds Crushing Industry Inquiry Committee)

QUESTIONNAIRE TO THE FEDERATION OF INDIAN CHAMBERS OF COMMERCE AND INDUSTRY, ALL INDIA ASSOCIATIONS OF EXPORTERS OF OILS AND OILSEEDS, THE INDIAN CENTRAL OILSEEDS COMMITTEE AND THE ALL-INDIA KHADI AND VILLAGE INDUSTRIES BOARD.

[For purposes of this questionnaire, Oilseeds mean groundnut, Sesamum, Rape and Mustard, Castor, Linseed, Cottonseed and Coconut and Minor oilseeds (Tobacco, Kardi, Niger, Neem, Mohuwa etc.).]

1. What is the quantity of oils, oilseeds and oil cakes exported from India during the last 3 years? Please give figures separately for each year and separately for each oilseed.

2. Were the oils and oilcakes exported produced by mills or was any quantity also produced by ghanis? If any quantity was produced by ghanis, please give figures separately for ghani oil and oil cakes.

3. Have you any idea of the uses of which the importing countries put these oils and oilcakes? (Please give figures separately for each oil).

4. A suggestion has been made that all edible oil should be produced by ghanis. If this suggestion were accepted, how will it affect the exports of oils from India?

5. There is at present a cess of annas 2 per maund of all oilseeds exported from India. Do you think that the cess could be increased without injuring India's export trade? If so, to what extent?

APPENDIX E

MINISTRY OF FOOD AND AGRICULTURE

(Oilseeds Crushing Industry Inquiry Committee)

QUESTIONNAIRE TO STATE ORGANISATIONS OF OIL CRUSHERS. COPIES OF THIS QUESTIONNAIRE WILL BE SENT TO THE ALL INDIA ORGANISATIONS OF OIL CRUSHERS FOR GIVING A REPLY ON AN ALL INDIA BASIS.

[For the purposes of this questionnaire, oilseeds mean Groundnut, Sesamum, Rape & Mustard, Castor, Linseed, Cottonseed and Coconut and minor oilseeds (Tobacco, Kardi, Niger, Neem, Mohuwa).]

1. What is the number of oil mills in your State? (Please give figures separately by types, i.e., rotary expeller, hydraulic press, etc.).

2. What is the quantity of oilseeds crushed by oil mills in your State? (Please give figures by various oilseeds).

3. What is the quantity of oil produced by oil mills in your State? (Please give figures by various oils).

4. What is the quantity of oilcakes produced by mills in your State? (Please give figures by various oilcakes). How are these oilcakes used?

5. How is the oil produced by the mills used? Please give figures separately under the following heads:—

- (a) Edible purpose.
- (b) Conversion into Vanaspati.
- (c) Used for paints and varnishes.
- (d) Used in the manufacture of soaps.
- (e) Used in the manufacture of biscuits.
- (f) Used by tanning industries.
- (g) Used by woollen mills.
- (h) Used by textile mills.
- (i) Used by Chemical, Pharmaceutical and Toilet industries.
- (j) Used for lubrication.
- (k) Miscellaneous uses.

6. What is the oilseeds crushing capacity of the mills in your State? Is this capacity fully utilised? If not, what is the un-utilised capacity?

7. How many persons are employed by the oilseeds milling industry in your State? Please give figures separately for (a) skilled and (b) unskilled categories.

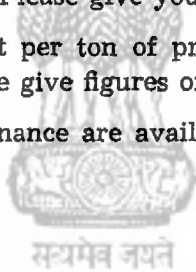
8. How many persons could be employed if the full oilseeds crushing capacity were utilised? Please give figures separately for (a) skilled, (b) unskilled categories.

9. A suggestion has been made that all edible oils should be crushed by ghanis and all non-edible oils should be crushed by mills. How will the acceptance of this suggestion affect the efficiency of production of oil, its nutritional value, the employment position, exports and supply of oil to consuming industries.

10. There is a cess of one anna per maund on oil produced by power mills. A suggestion has been made that this cess should be increased and funds realised by utilised for helping the village Oilseeds Crushing Industry. Please give your views on this suggestion.

11. Please give the cost per ton of production of oil by power-mills in your State. Please give figures oil by oil.

12. What facilities of finance are available to the mills?



APPENDIX F

MINISTRY OF FOOD AND AGRICULTURE

(Oilseeds Crushing Industry Inquiry Committee)

QUESTIONNAIRE TO THE ALL-INDIA KHADI AND VILLAGE INDUSTRIES BOARD, BOMBAY, AND THE INDIAN CENTRAL OILSEEDS COMMITTEE, HYDERABAD (DN.).

[For purposes of this questionnaire, Oilseeds mean Groundnut, Sesamum, Rape and Mustard, Castor, Linseed, Cottonseed and Coconut and minor oilseeds (i.e., Tobacco, Kardi, Niger, Neem, Mohuwa etc.).]

1. What is the number of Village Ghanis in the country? (Please give figures State by State).

2. What is the quantity of Oilseeds crushed by the Village Ghanis? (Please give figures by States and by oilseeds).

3. What is the quantity of oil produced by Village Ghanis? (Please give figures by States and by oils).

4. How is the oil produced by Ghanis utilised? Please give figures under the following heads:—

- (a) Edible purposes.
- (b) Conversion into Vanaspati.
- (c) Used for paints and varnishes.
- (d) Used in the manufacture of soaps.
- (e) Used in the manufacture of biscuits.
- (f) Used by tanning industries.
- (g) Used by woollen mills.
- (h) Used by textile mills.
- (i) Used by Chemicals, Pharmaceutical and Toilet industries.
- (j) Miscellaneous uses.

5. Please give details of work done by the Indian Central Oilseeds Committee/All Indian Khadi and Village Industries Board, for the benefit of the Village Oilseeds Crushing Industry. In particular, please furnish the following information:—

- (i) The amount invested so far by the Board/Committee for helping the Village Oilseeds Crushing Industry.
- (ii) The number of oilmen covered by the Board/Committee's operations.
- (iii) The number of improved types of ghanis introduced by the Board/Committee.

(iv) The economic benefits to the oilmen by the activities of the Board/Committee.

6. Give details of plans of the Board/Committee for the development of the Village Oilseeds Crushing Industry in the country.

7. What will be the finances required (recurring and non-recurring) by the Committee/Board to cover all Village oilmen in the country over a number of years? Please give the number of years during which the Committee/Board would cover the whole country in the matter of assistance to Village Oilseeds Crushing Industry keeping in view the limitations of finance, personnel, organisation etc.

8. At present the Village Oilseeds Crushing Industry is being helped partly by the Indian Central Oilseeds Committee and partly by the All-India Khadi and Village Industries Board. Would you suggest a separate statutory or non-statutory body for rehabilitation of and assistance to the Village Oilseeds Crushing Industry?

9. A suggestion has been made that the existing cess on oils produced by mills should be increased and the money should be utilised for assisting the Village Oilseeds Crushing Industry. What increase would you suggest? The existing cess is one anna per maund of oil produced by power mills.

10. Would you suggest an increase in the cess on the oilseeds exported out of India? The existing rate is annas 2 per maund of oilseeds exported from India.

11. Has the Committee/Board collected any data with regard to the nutritional value of oils and oilcakes produced by ghanis and power mills? If so, the particulars may kindly be furnished.

12. A suggestion has been made that all edible oils should be produced by ghanis. Is this suggestion workable considering the effect it will have on the efficiency of production, the nutritional value of oil, employment position, supply of oils to the consuming industries and exports?

13. What marketing arrangements have been organised by the Committee/Board for marketing of oil produced by village ghanis? What would be the ideal arrangement for marketing of oil produced by village ghanis?

14. Any other suggestion which the Committee/Board may like to make for the benefit of the Village Oilseeds Crushing Industry Inquiry Committee in the light of its terms of reference.

APPENDIX G

QUESTIONNAIRE TO ALL INDIA AND STATE ORGANISATIONS OF OIL MILLERS

1. (a) What percentage of oil and cake is obtained from 100 per cent kernels or seeds processed (crushed) in your mills for all oils, separately for each oil to be furnished thus:

% oil extracted

% cake obtained

% handling and processing losses.

100%

(b) What are the average oil yields for all oilseeds crushed in your expeller mills, separately for each oil.

2. State the repair costs for expellers/rotaries in your mills for 100 tons of seed crushed.

3. State tons of oilseeds crushed separately for each type of seed during the last 12 months together with the No. of days and number of hours each day, separately for each seed.

4. State the number, make, type and the year of procurement of expellers/rotary mills.

5. Please give an estimate of the capacity of each type of machine for groundnut, sesamum, mustard, linseed, copra or castor (i.e., capacity for each oilseed) from your experience in your mills.

6. Give number of persons employed for crushing the oilseeds mentioned in the above question in your mills on a basis of one ton of seed crushed.

7. Give kilowatt hours utilised for crushing the above seeds on the basis of one ton of seed crushed.

8. Give average transport charges of Kernels or seeds to your mills per 1 ton of oilseeds, for each variety you crush.

9. Estimate your crushing cost, which should include salaries, wages, repairs, fuel, power, cattle feed, costs, depreciation, insurance and overhead charges, for each variety of oilseed, per ton of seed crushed.

10. How much of various oil cakes are used for cattlefeed, separately for each variety of oil cake.

11. How many mills in your State crush one type of seed, how many two types of seed, how many three types of seeds etc. etc. Please mention also the types of seeds.

APPENDIX H

OIL CONTENT (PER CENT.) OF OIL CAKES

(Analytical data obtained at Oil Technological Institute, Anantapur during 1952-54)

| Sl. No. | Sample No. | Name of Oil cake | State and district from which sample received | Oil content—percent on 5% moisture basis | | |
|---------|------------|------------------|---|--|-------------|---------------|
| | | | | Expeller | Rotary mill | Country ghani |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1 | C-1 | Groundnut cake | Mysore (Bellary) | 10.7 | .. | .. |
| 2 | C-2 | Do. | Andhra (Chittoor) | 8.9 | .. | .. |
| 3 | C-3 | Do. | " (Anantapur) | 9.3 | .. | .. |
| 4 | C-4 | Do. | " (Anantapur) | 8.9 | .. | .. |
| 5 | C-5 | Do. | " (Anantapur) | 9.4 | .. | .. |
| 6 | C-6 | Do. | " (Kurnool) | 9.2 | .. | .. |
| 7 | C-7 | Do. | " (Chittoor) | 6.4 | .. | .. |
| 8 | C-8 | Do. | " (Cuddappah) | 8.4 | .. | .. |
| 9 | C-9 | Do. | " (Cuddappah) | 8.8 | .. | .. |
| 10 | C-10 | Do. | " (West Godavari) | 7.3 | .. | .. |
| 11 | C-11 | Do. | " (Kurnool) | 5.7 | .. | .. |
| 12 | C-12 | Do. | " (Kurnool) | 7.4 | .. | .. |
| 13 | C-13 | Do. | " (Kurnool) | 8.8 | .. | .. |
| 14 | C-15 | Do. | Madras (Palghat) | 7.9 | .. | .. |
| 15 | C-17 | Do. | Andhra (Anantapur) | 6.5 | .. | .. |
| 16 | C-20 | Do. | Madras (Madurai) | 8.6 | .. | .. |
| 17 | C-22 | Do. | Andhra (Kurnool) | 9.1 | .. | .. |
| 18 | C-23 | Do. | " (Cuddappah) | 9.0 | .. | .. |
| 19 | C-24 | Do. | " (Cuddappah) | 7.5 | .. | .. |
| 20 | C-25 | Do. | " (Cuddappah) | 8.8 | .. | .. |
| 21 | C-26 | Do. | " (Cuddappah) | 8.5 | .. | .. |
| 22 | C-28 | Do. | " (Cuddappah) | 8.5 | .. | .. |
| 23 | C-29 | Do. | " (Anantapur) | 8.6 | .. | .. |
| 24 | C-30 | Do. | Madras (Virudhunagar) | 8.5 | .. | .. |
| 25 | C-31 | Do. | Andhra (Chittoor) | 9.2 | .. | .. |
| 26 | C-33 | Do. | " (Kurnool) | 6.8 | .. | .. |
| 27 | C-34 | Do. | " (Anantapur) | 8.0 | .. | .. |
| 28 | C-35 | Do. | " (Anantapur) | 8.0 | .. | .. |
| 29 | C-36 | Do. | " (Anantapur) | 9.0 | .. | .. |
| 30 | C-40 | Do. | " (Vizag) | 7.3 | .. | .. |
| 31 | C-41 | Do. | " (Chittoor) | 8.2 | .. | .. |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|----|----------|----------------|---------------------|------|---|------|
| 32 | C-42 | Groundnut cake | Andhra (Anantapur) | 7.5 | .. | .. |
| 33 | C-43 | Do. | Madras (Tiruputhur) | 8.8 | .. | .. |
| 34 | C-46 | Do. | „ (Tiruputhur) | 7.2 | .. | .. |
| 35 | C-47 | Do. | „ (Tiruputhur) | 6.8 | .. | .. |
| 36 | C-48 | Do. | „ (N. Arcot) | 10.5 | .. | .. |
| 37 | C-49 | Do. | „ (Ambur) | 10.2 | .. | .. |
| 38 | C-50 | Do. | Andhra (Srikakulam) | 9.3 | .. | .. |
| 39 | C-51 | Do. | „ (Srikakulam) | 7.3 | .. | .. |
| 40 | C-52 | Do. | „ (Anantapur) | 7.3 | .. | .. |
| 41 | C-53 | Do. | „ (Chittoor) | 9.4 | .. | .. |
| 42 | C-54 | Do. | „ (Vizag) | 7.2 | .. | .. |
| 43 | C-55 | Do. | „ (Vizag) | 7.5 | .. | .. |
| 44 | C-60 | Do. | „ (Kurnool) | 6.8 | .. | .. |
| 45 | C-66 | Do. | „ (Anantapur) | 7.4 | .. | .. |
| 46 | C-67 | Do. | „ (Anantapur) | 8.2 | .. | .. |
| 47 | C-73 | Do. | „ (Srikakulam) | 11.6 | .. | .. |
| 48 | C-74 | Do. | „ (Anantapur) | 9.0 | .. | .. |
| 49 | C-75 | Do. | „ (Kurnool) | 8.3 | .. | .. |
| 50 | C-77 | Do. | „ (Krishna) | 8.7 | .. | .. |
| 51 | C-79 | Do. | „ (Vizag) | 9.9 | .. | .. |
| 52 | C-21 | Do. | Madras (Madurai) | .. | 10.9 | .. |
| 53 | C-80 (a) | Do. | Andhra (Chittoor) | .. | .. | 9.8 |
| 54 | C-80 (b) | Do. | „ (Chittoor) | .. | .. | 10.5 |
| 55 | C-82 | Do. | „ (Chittoor) | .. | .. | 9.6 |
| 56 | C-83 | Do. | „ (Chittoor) | .. | .. | 10.0 |
| 57 | C-14 | Copra Cake | Madras (Palghat) | 11.5 | .. | .. |
| 58 | C-16 | Do. | „ (Palghat) | 10.3 | .. | .. |
| 59 | C-19 | Do. | „ (S. Kanara) | .. | 10.5 | .. |
| 60 | C-38 | Do. | „ (S. Kanara) | .. | 11.9 | .. |
| 61 | C-39 | Do. | „ (S. Kanara) | .. | 11.7 | .. |
| 62 | C-68 | Do. | „ (Malabar) | .. | 16.0 | .. |
| 63 | C-69 | Do. | „ (Malabar) | .. | 13.1 | .. |
| 64 | C-70 | Do. | „ (Malabar) | .. | 12.9 | .. |
| 65 | C-71 | Do. | „ (Malabar) | .. | 13.0 | .. |
| 66 | C-76 | Do. | „ (Malabar) | .. | 12.0 | .. |
| 67 | C-78 | Do. | Andhra (Krishna) | .. | 12.1 | .. |
| 68 | C-96 | Do. | „ (Krishna) | .. | 12.2 | .. |
| 69 | C-62 | Sesamum cake | Madras (Ramnad) | .. | 12.4 | .. |
| 70 | C-72 | Do. | Madras (Salem) | .. | 10.7 | .. |
| | | | | | (Sholar pinto Chekku- power ghani). | |
| 71 | C-44 | Castor Cake | Madras (Tirupathur) | 7.6 | .. | .. |
| 72 | C-45 | Do. | „ (N. Arcot) | 6.7 | .. | .. |
| 73 | C-57 | Do. | „ (N. Arcot) | 7.6 | .. | .. |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|----|------|-----------------------|--------------------------------|-----|----|----|
| 74 | -64 | . Castor Cake | Madras (Salem) | 7.1 | .. | .. |
| 75 | C-27 | . Cottonseed cake. | Bombay (Dharwar- Hubli). | 4.6 | .. | .. |
| 76 | C-58 | . Do. | Bombay (Dharwar- Hubli). | 4.0 | .. | .. |
| 77 | C-65 | . Do. | Madhya Pradesh (Amr- aoti). | 6.4 | .. | .. |
| 78 | C-18 | . Neem Cake | Madras City | 9.8 | .. | .. |



सत्यमेव जयते

APPENDIX I

OIL CONTENT (PERCENTAGE) OF OIL CAKES

(Analytical data obtained at Oil Technological Institute, Anantapur
from 1st January 1955 upto 20th May 1955)

| Sl. No. | Sample No. | Name of the Oil Cake | State & District from which the sample is received | Oil Content (%) on 5% moisture basis | | |
|---------|------------|----------------------|--|--------------------------------------|--------|-------|
| | | | | Expeller | Rotary | Ghani |
| 1 | C-85 | Groundnut | Chittoor (Andhra) | .. | .. | 8.6 |
| 2 | C-86 | Do. | Do. (Do.) | .. | .. | 9.0 |
| 3 | C-87 | Do. | Do. (Do.) | .. | .. | 8.8 |
| 4 | C-88 | Do. | Do. (Do.) | .. | .. | 9.0 |
| 5 | C-89 | Do. | Do. (Do.) | .. | .. | 8.4 |
| 6 | C-92 | Do. | Cuddapah (Do.) | 7.8 | .. | .. |
| 7 | C-93 (a) | Do. | Chittoor (Do.) | .. | .. | 9.5 |
| 8 | C-93 (b) | Do. | Chittoor (Do.) | .. | .. | 8.9 |
| 9 | C-93 (c) | Do. | Chittoor (Do.) | .. | .. | 9.0 |
| 10 | C-102 | Do. | Vijayawada (Do.) | 7.7 | .. | .. |
| 11 | C-103 | Do. | Vijayawada (Do.) | 8.1 | .. | .. |
| 12 | C-104 | Do. | Vizagapatam (Do.) | .. | .. | 11.2 |
| 13 | C-107 | Do. | Ramnad (Madras) | 6.5 | .. | .. |
| 14 | C-108 | Do. | Do. (Do.) | 7.1 | .. | .. |
| 15 | C-109 | Do. | Do. (Do.) | 7.9 | .. | .. |
| 16 | C-114 | Do. | Vizag (Andhra) | .. | .. | 11.6 |
| 17 | C-90 | Sesamum | Nellore (Andhra) | .. | .. | 10.7 |
| 18 | C-94 | Do. | Do. (Do.) | .. | .. | 11.9 |
| 19 | C-101 | Do. | Do. (Do.) | .. | .. | 11.2 |
| 20 | C-105 | Do. | Do. (Do.) | .. | .. | 11.5 |
| 21 | C-111 | Do. | Do. (Do.) | .. | .. | 10.0 |
| 22 | C-112 | Do. | Vizag (Do.) | .. | .. | 14.5 |
| 23 | C-113 | Do. | Do. (Do.) | .. | .. | 18.4* |
| 24 | C-116 | Do. | Nellore (Do.) | .. | .. | 13.5 |
| 25 | C-119 | Do. | Do. (Do.) | .. | .. | 11.5 |
| 26 | C-81 | Copra | Malabar (Madras) | .. | 10.8 | .. |
| 27 | C-106 | Do. | Ramnad (Do.) | .. | 11.0 | .. |
| 28 | C-121 | Do. | Malabar (Do.) | .. | 11.0 | .. |
| 29 | C-95 | Castor | Nellore (Andhra) | .. | .. | 8.2 |
| 30 | C-110 | Do. | Do. (Do.) | .. | .. | 8.4 |
| 31 | C-115 | Do. | Do. (Do.) | .. | .. | 7.2 |
| 32 | C-118 | Do. | Do. (Do.) | .. | .. | 8.0 |

*Average of 4 experiments (18.6 ; 19.0 ; 18.1 ; 18.0).

APPENDIX J

*Analytical data obtained at Oil Technological Institute, Anantapur
from 20th May 1955 upto 24th November 1955*

| Sl. No. | Sample No. | Variety of sample (Name of the oil Cake) | District and State from which the samples was obtained | Oil Content (%) calculated on 5% moisture basis | | |
|---------|------------|---|---|---|--------|-------------------------|
| | | | | Expeller | Rotary | Ghani |
| 1 | C-122 | Castor | Nellore (Andhra) | .. | .. | 8.4 |
| 2 | C-127 | Do. | Cuddapah (Do.) | .. | .. | 8.1 |
| 3 | C-134 | Do. | Vijayawada (Do.) | .. | 9.2 | .. |
| 4 | C-135 | Do. | Rajahmundry (Do.) | .. | .. | 7.5 |
| 5 | C-143 | Do. | Chittoor (Do.)* | 7.9 | .. | .. |
| 6 | C-146 | Do. | Nellore (Do.) | .. | .. | 7.1 |
| 7 | C-152 | Do. | Nellore (Do.) | .. | .. | 9.7 |
| 8 | C-176 | Do. | Anantapur (Do.) | .. | .. | 9.6 |
| 9 | C-177 | Do. | Anantapur (Do.) | .. | 8.6 | .. |
| 10 | C-131 | Copra | Vijayawada (Do.) | .. | 12.7 | .. |
| 11 | C-138 | Do. | Nellore (Do.) | .. | .. | 18.2 |
| 12 | C-150 | Do. | Vijayawada (Do.) | .. | 12.8 | .. |
| 13 | C-154 | Do. | Godavari (Do.) | .. | 10.8 | .. |
| 14 | C-155 | Do. | Do. (Do.) | .. | 14.0 | .. |
| 15 | C-156 | Do. | Do. (Do.) | .. | 12.8 | .. |
| 16 | C-157 | Do. | Do. (Do.) | .. | .. | 15.0 |
| 17 | C-161 | Do. | Do. (Do.) | .. | .. | 17.5 |
| 18 | C-180 | Do. | Vijayawada (Do.) | .. | 12.8 | .. |
| 19 | C-178 | Mahua | Bombay (Bombay) | 8.3 (Hydraulic press) | | |
| 20 | C-179 | Do. | Coimbatore (Madras) | .. | 12.5 | .. |
| 21 | C-184 | Do. | Bangalore (Mysore) | .. | 14.1 | .. |
| 22 | C-191 | Do. | Bombay (Bombay) | 8.1 (Hydraulic press) | | |
| 23 | C-175 | Neem | Anantapur (Andhra) | .. | .. | 12.1 |
| 24 | C-189 | Do. | Nellore (Do.) | .. | .. | 14.7 |
| 25 | C-128 | Kardi (Kusum) | Cuddapah (Do.) | .. | .. | 7.6 (undecorticated) |

APPENDIX K

STATEMENT SHOWING THE CRUSHING CAPACITY OF VILLAGE GHANIS IN THE COUNTRY

(i) 2,04,006 Ghanis with five seers crushing capacity. Average capacity is taken as 3 seers per charge. 3 charges per day for 300 days.

$$\begin{aligned} \text{Total quantity} &= 3 \times 3 \times 300 \times \frac{2,04,006}{40} \text{ Mds.} \\ &= 15 \times 9,18,027 \text{ Mds.} \\ &= 1,37,70,405 \text{ Maunds.} \end{aligned}$$

(ii) 2,42,430 Ghanis with five or more seers capacity per charge. Average capacity is taken as 7 seers per charge per day for 300 days.

$$\begin{aligned} \text{Total quantity} &= 3 \times 7 \times 300 \times \frac{2,42,430}{40} \\ &= 315 \times 1,21,215 \text{ Mds.} \\ &= 3,81,82,725 \text{ Mds.} \\ \text{Total of (i) \& (ii)} &= 5,19,53,130 \text{ Mds.} \\ &= 19,10,042 \text{ tons.} \end{aligned}$$

(iii) Wardha Ghani's crushing capacity is taken as 10 seers per charge. Each charge is 1 hour.

5 charges in a day—There are 1,960 W. Ghanis (introduced by Indian Central Oilseeds Committee).

$$\begin{aligned} \text{Total quantity} &= \frac{10 \times 1,960 \times 5 \times 300}{40} \text{ Mds.} \\ &= 2,450 \times 300 \text{ Maunds.} \\ &= 7,35,000 \text{ Mds.} \\ &= 27,022 \text{ tons.} \end{aligned}$$

**STATEMENT OF CRUSHING CAPACITY OF THE POWER OIL MILLS IN THE
COUNTRY**

- | | | | |
|----------------------|---|-------------------|--------|
| Total of (1) and (4) | = | 30,89,015.3 tons | |
| Utilised capacity | = | 20,72,000.0 tons | = 67% |
| Not utilised | = | 10,17,015.3 tons. | = 33%. |

| | | | |
|----------------------|---|-------------------|--------|
| Total of (1) and (4) | = | 30,89,015.3 tons | |
| Utilised capacity | = | 20,72,000.0 tons | = 67% |
| Not utilised | = | 10,17,015.3 tons. | = 33%. |

Utilised capacity = 20,72,000.0 tons = 67%

Not utilised = 10,17,015.3 tons. = 33%.



APPENDIX M

PRODUCTION OF MINOR OILSEEDS IN VARIOUS STATES

| Seed | State in which cultivation is concentrated | Year of estimate | Average annual production (tons) |
|-------------------|--|------------------|----------------------------------|
| Niger | Bihar | 1944-45 | 9,000 |
| | Bombay | 1944-45 | 5,000 |
| | M. Pradesh | 1948-49 | 25,188 |
| | Madras | 1948-49 | 1,975 |
| | Orissa | 1948-49 | 8,926 |
| | Hyderabad | 1944-45 | 7,000 |
| | Mysore | 1952-53 | 1,000 |
| | M. Bharat | 1953-54 | 6,250 |
| | Bhopal | 1952-53 | 673 |
| | TOTAL | | 65,012 |
| Safflower (Kardi) | Bombay | 1948-49 | 147 |
| | Madras | 1948-49 | 2,710 |
| | Orissa | 1948-49 | 18 |
| | Mysore | 1952-53 | 1,000 |
| | TOTAL | | 3,875 |
| Mehuwa | Bihar | 1948-49 | 4,180 |
| | Bombay | 1948-49 | 6,600 |
| | M. Pradesh | 1948-49 | 1,506 |
| | Madras | 1948-49 | 5,900 |
| | Orissa | 1948-49 | 1,837 |
| | U. P. | 1948-49 | 18,000 |
| | West Bengal | 1948-49 | 178 |
| | Mysore | 1954-55 | 838 |
| | M. Bharat | 1953-54 | 14,706 |
| | Bhopal | 1952-53 | 2,950 |
| | TOTAL | | 56,695 |
| Tobacco Seed | Madras | 1949-50 | 8,100 |
| | M. Bharat | 1953-54 | 129 |
| | TOTAL | | 8,229 |
| Neem | Bombay | 1948-49 | 200 |
| | M. Pradesh | 1948-49 | 169 |
| | Madras | 1948-49 | 73,720 |
| | Orissa | 1948-49 | 51 |
| | U. P. | 1948-49 | 500 |
| | Mysore | 1952-53 | 243 |
| | M. Bharat | 1953-54 | 3,676 |
| | Bhopal | 1952-53 | 228 |
| | TOTAL | | 78,787 |
| Karanji | Madras | 1948-49 | 80,000 |
| | Mysore | 1952-53 | 4,993 |
| | M. Bharat | 1952-53 | 460 |
| | Bhopal | 1952-53 | 460 |
| | TOTAL | | 85,913 |
| Poppy | M. Bharat | 1953-54 | 2,573 |
| San & Ambadi | M. Bharat | 1953-54 | 9,559 |

APPENDIX N

SUMMARY OF THE ANALYSIS OF 388 COTTONSEED SAMPLES OBTAINED FROM 13 IMPORTANT COTTON PRODUCING STATES IN INDIA DURING 1952, 1953 AND 1954.

1. All the samples were obtained from the different States through the officials of the Agricultural Department of the concerned States by approved method of sampling of the commercial produce of seeds of the particular variety.

2. These samples were drawn from 49 important varieties of cotton produced in India. Of these, 35 were Desi and 14 American varieties.

3. Of the total cottonseed produced at present 76.3% and 74.9% are of Desi varieties and 23.7% and 25.1% of American varieties according to partially revised estimates for 1953-54 and Final Estimates for 1954-55 respectively, as furnished by the Indian Central Cotton Committee as well as the Economic and Statistical Adviser of Agricultural Ministry of Government of India.

4. The numbers of the Desi and American type samples received and analysed from the different States is given below:

| S. No. | Name of the State | No. of Desi variety samples analysed | No. of American variety samples analysed | Total of Cols. (3) and (4) |
|-----------------|--------------------------|--|--|----------------------------------|
| 1 | Andhra | 57 | 8 | 65 |
| 2 | Bhopal | 1 | Nil | 1 |
| 3 | Bombay | 42 | 10 | 52 |
| 4 | Hyderabad | 21 | 6 | 27 |
| 5 | Madhya Bharat | 19 | 13 | 32 |
| 6 | Madhya Pradesh | 12 | 3 | 15 |
| 7 | Madras | 21 | 38 | 59 |
| 8 | Mysore | 14 | 25 | 39 |
| 9 | Pepsu | 4 | 4 | 8 |
| 10 | Punjab | 9 | 20 | 29 |
| 11 | Rajasthan | 12 | 23 | 35 |
| 12 | Saurashtra | 7 | 1 | 8 |
| 13 | Uttar Pradesh | 16 | 2 | 18 |
| TOTAL | | 235 | 153 | 388 |

5. Data obtained on the Lint contents of Desi and American varieties on 'as is' basis is classified as below:

| Sl. No. | Limits of lint content | Desi varieties | | American varieties | |
|---------|------------------------|----------------|---------------------------|--------------------|---------------------------|
| | | No. | Percent. of total samples | No. | Percent. of total samples |
| 1 | Below 0—3% | 26 | 13 | 2 | 1 |
| 2 | From 3—4.9% | 60 | 29 | 3 | 2 |
| 3 | From 5—7.4% | 60 | 29 | 24 | 17 |
| 4 | From 7.5—9.9% | 38 | 18 | 65 | 46 |
| 5 | From 10% and above | 20 | 10 | 48 | 34 |

6. The data on the oil content of Desi and American varieties of cottonseed samples analysed is classified as below:

| Sl. No. | Limits of oil content | Desi varieties | | American varieties | |
|---------|-----------------------|----------------|---------------------------|--------------------|---------------------------|
| | | No. | Percent. of total samples | No. | Percent. of total samples |
| 1 | Below 15% | 11 | 5 | 3 | 2 |
| 2 | From 15—17.4% | 81 | 34 | 38 | 25 |
| 3 | From 17.5—19.9% | 124 | 53 | 72 | 47 |
| 4 | From 20% and above | 19 | 8 | 40 | 26 |

APPENDIX O

NUMBER OF OILMILLS* IN THE INDIAN UNION

| | |
|-----------------------------|-------|
| Andhra | 438 |
| Assam | 72 |
| Bihar | 426 |
| Bombay | 1,236 |
| Madhya Pradesh | 290 |
| Madras | 858 |
| Orissa | 35 |
| Punjab | 1,302 |
| Uttar Pradesh | 1,683 |
| West Bengal | 254 |
| Hyderabad | 280 |
| Madhya Bharat | 199 |
| Mysore | 163 |
| Pepsu | 180 |
| Rajasthan | 315 |
| Saurashtra | 158 |
| Travancore-Cochin | 138 |
| Ajmer | 8 |
| Bhopal | 22 |
| Delhi | 73 |
| Himachal Pradesh | 4 |
| Kutch | 4 |
| Manipur | 5 |
| Tripura | 20 |
| Vindhya Pradesh | 41 |
| TOTAL | 8,201 |

* = 'Mill' means any premises in which or in any part of which oilseeds are crushed or are ordinarily crushed with the aid of power.

APPENDIX Q

THE RELATIVE KEEPING QUALITY OF GHANI AND EXPELLER PRESSED CRUDE GROUNDNUT OIL

(Stored in tin cans at 37°C)

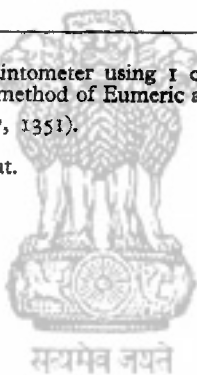
| Name of oil | Mois- ture % | Initials* colour Lovibond Units | | Initial† Vitamin E content mgs/100 g | Initial free fatty acid (as oleic acid)% | Rate of development of Peroxides during storage | | | |
|----------------------|--------------------|--|-----|---|--|--|-------|--------|--------|
| | | | | | | 0 | 1 | 2 | 3 |
| | | Yellow Red | | | | Month | Month | Months | Months |
| I | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| *Ghani pressed oil | 0.25 | 2.6 | 0.3 | 32.5 | 1.5 | 0 | 2.8 | 4.3 | 6.2 |
| Expeller pressed oil | 0.19 | 2.2 | 0.2 | 29.2 | 1.5 | 0 | 3.4 | 5.1 | 7.6 |

*Determined in a Lovibond tintometer using 1 cm cell.

†Determined according to the method of Eumeric and Engel.

(Rec. Trav. chim (1938), 57, 1351).

—
Millimols thio per kg. of fat.



APPENDIX R

SUMMARY OF THE RESULTS OF EXPERIMENTS CARRIED OUT AT THE INDIAN VETERINARY RESEARCH INSTITUTE, IZATNAGAR, REGARDING THE NUTRITIVE VALUE OF OIL CAKES PRODUCED BY VARIOUS METHODS.

In India, oil cakes are prepared by three methods. In villages it is produced by the bullock driven ghani and in towns by expellers. The third method of solvent extraction is carried out only on a limited scale. Ghani pressed cake contains about 12—20 per cent. oil, expeller pressed cake about 7—12 per cent. and solvent extracted cake about 0.5 to 1.0 per cent. In view of the shortage of oils and fats for human consumption and to increase the export quota of oils and fats, it was suggested that the expeller and ghani pressed oil cakes should be further deoiled by solvent extraction as by this method, the remaining oil will also be available. It has, however, to be borne in mind that India being a predominantly agricultural country, livestock play an important role in the welfare of the people. Since oilseed cake is essentially the main source for the supply of fat besides protein to our animals, grains being already in short supply, it was considered desirable to assess the nutritive value of solvent extracted cakes *vis-a-vis* cakes pressed by the other two methods and also their effect on the health and productive capacity of animals.

A scheme was, therefore, initiated under the auspices of Indian Central Oilseeds Committee in January, 1950, which embraced studies on the following aspects of this problem:—

1. Studies on the nutritive value of oil cakes.
2. Studies on the effect of feeding oil cakes on growth rate and digestibility of proximate principles in calves.
3. Studies on the effect of feeding oil cakes on digestibility of proximate principles, milk yield and fat production in cows.
4. Studies on fat requirement of cattle.
5. Studies on the nutritive value of cottonseed and cottonseed cake and their effect on milk and fat production.

6. Chemical composition of oil cakes prepared by ghani expeller and solvent extraction processes as affected by storage.
7. Tolerance limits of argimone oil.

I. STUDIES ON THE NUTRITIVE VALUE OF OIL CAKES

In view of the conflicting opinions, regarding the feeding value of the three types of oil cakes, experiments were planned to study the nutritive value of oil cakes prepared by different methods.

Some of the common oilseeds as til, mustard, groundnut and linseed were taken up. A stock of seeds were pooled at one place. One part of the pooled stock was got pressed by ghani and other two parts by expeller method. Half of the expeller pressed cake was further deoiled by solvent extraction process.

The chemical composition, palatability and nutritive value of oil cakes prepared by the above methods were determined by conducting feeding trials on cattle.

(a) *Nutritive value of solvent extracted, expeller pressed and ghani pressed til (Sesamum indicum) cake*

Three comparable groups of adult Kumaoni bullocks of 6 each were fed solvent extracted, expeller pressed and ghani pressed til cakes respectively to meet the digestible protein requirements. Wheat bhoosa was fed *ad lib* as the sole roughage in all the three groups.

The ether extract level in the total rations on dry basis were 0.98, 1.71 and 2.67 per cent. for solvent expeller and ghani groups respectively.

The digestibility coefficients for crude protein, ether extract and total carbo-hydrates were 49.25, 56.25, 46.93, 60.44, 74.04 and 49.85, 49.47 and 47.72 for solvent, expeller and ghani groups respectively.

The digestibility coefficients of ether extract increased with the increase in the fat level in ration and was significant. The variations in the digestibility coefficients of crude protein and total carbo-hydrates were not significant.

The digestible crude protein in lbs. per 100 lb. dry matter was 37.08, 33.92 and 33.03 for solvent extracted, expeller pressed and ghani pressed til cakes respectively.

The average total digestible nutrients of ration consumed per 100 lb. dry material were 45.92, 44.48 and 46.19 lb. and ingested

per 100 lb. body weight were 493, 537 and 560 gms. for solvent, expeller and ghani groups respectively, and the differences did not exhibit significance.

The balances for calcium, phosphorus and nitrogen were positive for all the three groups.

(b) *Nutritive value of solvent extracted, expeller pressed and ghani pressed mustard (Brassica campestris) cakes*

Three comparable groups of adult Kumaoni bullocks of 6 each were fed solvent extracted, expeller and ghani pressed mustard cakes to meet their digestible protein requirement. Wheat bhoosa was fed *ad lib* as the only roughage to all the animals.

The fat percentage in solvent expeller and ghani groups was 1.08, 2.27 and 2.42 respectively.

The digestibility coefficients for crude protein, ether extract and total carbo-hydrates were 43.98, 50.37 and 51.97 and 46.6, 67.3, 69.9 and 53.29, 50.70 and 54.94 for solvent, expeller and ghani cake groups respectively.

The digestibility of crude protein and ether extract increased with the increase in the fat level and the differences demonstrated significance in both the cases. The digestibility of total carbo-hydrates did not show significance.

The digestible crude protein per 100 lbs. dry matter was 31.27, 30.98 and 30.98 lbs. per solvent, expeller and ghani pressed mustard cakes respectively.

The average total digestible nutrients of total ration, consumed per 100 lb. dry material were 48.55, 48.95 and 50.85 lbs. and ingested per 100 lb. body weight were 598, 551 and 569 gms. respectively for solvent, expeller and ghani cake groups and the differences were not significant.

The balance for calcium, phosphorus and nitrogen were positive for all the three groups.

(c) *Nutritive value of solvent extracted expeller pressed and ghani pressed groundnut (Arachis hypogaea) cakes*

Three comparable groups of adult Kumaoni bullocks of 4 each were fed solvent extracted, expeller pressed and ghani pressed groundnut cakes to meet their digestible protein requirements. Wheat bhoosa was fed *ad lib* as the sole roughage to all the animals.

The fat percentages for the ghani, expeller and solvent groundnut cake groups were 2.11, 1.68 and 0.78 respectively.

The digestible coefficients for crude protein, ether extract and total carbo-hydrates were 58.11, 58.70 and 61.51, 46.43, 66.06 and 74.06 and 55.76, 56.64 and 55.30 for solvent, expeller and ghani pressed cake groups respectively.

The digestibility coefficients of crude protein and ether extract increased with the increase in the fat per cent. but showed significance only in the case of ether extract. The differences in the digestibility of total carbo-hydrates were not significant.

The digestible crude protein per 100 lbs. dry matter in the solvent extracted, expeller pressed and ghani pressed groundnut cake were 46.95, 45.47 and 47.02 lb. respectively.

The average total digestible nutrients of total ration, consumed per 100 lb. dry material were 52.25, 54.09 and 54.22 lb. and ingested per 100 lb. body weight were 529, 579 and 564 gms. for solvent, expeller and ghani groups respectively. The differences were not significant.

The balances for calcium and phosphorus were negative while those of nitrogen were positive.

(d) *Nutritive value of solvent extracted, expeller pressed and ghani pressed linseed (Linum Sitaticismum) cakes*

Three comparable groups of adult Kumaoni bullocks of 4 each were respectively fed solvent extracted, expeller pressed and ghani pressed linseed cakes to meet their digestible protein requirements. Wheat bhoosa was fed *ad lib* as the sole roughage to all the animals.

The fat percentage on dry basis was 0.68, 2.21 and 2.50 for the solvent, expeller and ghani groups respectively.

The digestibility coefficients for crude protein, ether extract and total carbo-hydrates were 51.07, 51.43 and 52.58; 33.36, 77.24 and 80.06 and 51.74, 51.02 and 49.22 for solvent extracted, expeller pressed and ghani pressed cake groups respectively.

The digestibility coefficients of crude protein and ether extract increased with the increase in the fat per cent. but shows significance only in the case of ether extract. The differences in the digestibility of total carbo-hydrates do not show significance.

The digestible crude protein in lbs. per 100 lb. dry matter in the solvent extracted expeller and ghani pressed linseed cakes was 27.83, 24.55 and 24.64 respectively.

The average total digestible nutrients of total ration, consumed per 100 lb. dry material were 47.33, 49.24 and 48.74 lb. and ingested per 100 lb. body weight were 534, 615 and 557 gms. for solvent, expeller and ghani cake groups respectively and the differences do not show significance.

The balances for nitrogen were positive in all the three groups while those of calcium and phosphorus were slightly negative in solvent group and positive in expeller and ghani cake groups.

Summing up the results of experiments conducted on four types of oil cakes viz., til, mustard, groundnut and linseed, to study the effect of processing on nutritive value, it was observed that the digestibility of ether extract of the ration in all the four experiments increased in the order of solvent extracted, expeller pressed and ghani pressed cakes groups. The digestibility of crude protein of the ration showed a similar trend in 3 out of 4 experiments but the differences were much smaller, so much so, that they did not come out to be significant. However, a pooled analysis of data of all the four experiments exhibited significant differences between the processes. In the case of digestibility of total carbo-hydrates, the differences were not significant in all the 4 experiments.

Total digestible nutrients per 100 lb. dry matter consumed and total digestible nutrients ingested per 100 lb. body weight also exhibited no significant variations.

(e) *Nutritive value of soyabean cake*

Six adult Kumaoni bullocks were selected for the experiment. The digestible protein requirements were met by feeding soyabean cake. Wheat bhoosa was fed as the sole roughage to all the six animals.

The chemical composition of soyabean cake was crude protein, 40.94; ether extract, 14.42; crude fibre, 6.10; nitrogen free-extract, 31.28; total carbo-hydrates 37.38; total ash, 7.26; calcium, 0.50 and phosphorus (P_2O_5) 2.12.

Crude protein content of soyabean cake is higher than that of linseed, til and mustard cakes and lower than that of groundnut cakes. The calcium content of this cake is higher than that of groundnut and mustard but lower than that of til cake.

The fat percentage on dry basis was 2.88 in the total ration.

The digestible crude protein in lbs. of soyabean cake was 38.5 per 100 lb. dry material, which was higher than that of linseed, til and mustard cakes and lower than that of groundnut cake. The average

total digestible nutrients of the ration containing soyabean cake were 54.6 lbs.

The balances for calcium, phosphorus and nitrogen were positive.

II. STUDIES ON THE EFFECT OF FEEDING OIL CAKES ON GROWTH RATE AND DIGESTIBILITY OF PROXIMATE PRINCIPLES

In view of the paucity of information and the inconclusive nature of the evidence available, it was desired to investigate whether the feeding of oil cakes, containing different levels of fat due to methods of preparation had any effect on growth rate and digestibility of proximate principles in calves.

(a) *Mustard (Brassica campestris) cake prepared by (i) ghani (ii) expeller and (iii) solvent extraction processes.*

15 Haryana calves between 6 to 12 months of age were divided into 3 comparable groups of 5 each, consisting of 4 females and 1 male calf. The composition of the concentrate mixture was 50 parts cake, 25 parts barley, 12.5 parts oats and 12.5 parts wheat bran. The cake in the 3 concentrate mixtures was solvent extracted, expeller pressed and ghani pressed mustard cake respectively. Wheat bhoosa and greens were given as roughages and 2 gm. trace element mixture was fed twice per week to each calf, weekly observations of body weights were recorded. One female calf which fell ill during the experimental feeding was discarded along with its counterparts in the other two feed groups.

After 31 weeks feeding, a metabolism trial was conducted.

The percentage of ether extract in the total ration worked out to be 1.08, 2.90 and 4.12 for solvent expeller and ghani groups respectively.

The digestible coefficients for crude protein, ether extract and total carbo-hydrates were 65.5, 65.1 and 65.1; 55.3, 78.3 and 78.7, and 60.7, 58.3 and 56.6 for solvent, expeller and ghani groups respectively.

The digestibility of ether extract increased with the increase in the fat per cent. and significance was observed, whereas that of crude protein and total carbo-hydrates showed a decreasing trend and there was significance only in case of total carbo-hydrates.

The average total digestible nutrients ingested per 100 lbs. body weight were 784, 806 and 792 gms. for solvent, expeller and ghani cake groups and the differences were not significant.

The balances for calcium, phosphorus and nitrogen were positive in all the three groups.

The feeding of the calves on concentrate mixtures containing solvent extracted, expeller pressed and ghani pressed cakes was continued for a period of 52 weeks.

The average weekly gain in weight and average final weights were 6.0, 5.7 and 5.8 lbs. and 481.0, 468.5 and 472.2 lbs. for solvent extracted, expeller pressed and ghani pressed cake groups respectively and the differences did not show significance indicating thereby that growth is not affected by the method of processing.

(b) *Linseed (Linum sitaticum) cake prepared by (i) ghani (ii) expeller and (iii) solvent extraction processes*

18 Harijana calves 5—12 months old were divided into three comparable groups of 6 each, comprising of 3 male and 3 female calves. The concentrate mixture fed to calves consisted of 50 parts linseed cake, 25 parts barley, 12.5 parts oats and 12.5 parts wheat bran. The linseed cake fed was solvent extracted in the 1st group, expeller pressed in 2nd group and ghani pressed in 3rd group. 2 gms. of trace element mixture was fed twice per week to each calf. Greens and wheat bhoosa *ad lib* were fed as roughages. Weekly body weights were recorded.

After 29 weeks of experimental feeding, a metabolic trial was conducted.

The fat percentage in the total ration were 1.24, 3.03 and 3.36 for solvent extracted, expeller pressed and ghani pressed cake groups respectively.

The digestibility coefficients for crude protein, ether extract and total carbo-hydrates were 60.87, 63.24 and 65.71; 35.67, 70.94 and 71.85 and 60.67, 59.38 and 60.62 for solvent extracted, expeller pressed and ghani pressed cake groups respectively.

The digestibility of crude protein and ether extract increased with the increase in the fat per cent. and differences in both the cases were significant. There was no significant variation in the digestibility of total carbo-hydrates.

The average total digestible nutrients ingested per 100 lbs. body weight were 830, 906 and 896 gms. per day for solvent extracted, expeller pressed and ghani pressed cake groups respectively and the differences were not significant.

The balances for calcium, phosphorus and nitrogen were positive in all the three groups.

The feeding of calves on concentrate mixture containing solvent extracted, expeller pressed and ghani pressed linseed cakes was continued for a period of 46 weeks.

The average weekly gain in weight and average final weights were 4.0, 4.5 and 4.3 and 328.4, 344.7 and 340.2 lbs. for solvent, expeller and ghani groups respectively and the differences are not significant indicating that the growth rate of calves is not affected by processing.

III. STUDIES ON THE EFFECT OF FEEDING OIL CAKES ON DIGESTIBILITY OF PROXIMATE PRINCIPLES, MILK YIELD AND FAT PRODUCTION IN COWS

There is a conflict of opinion regarding the requisite fat content in rations and as such the effect of feeding pressed and solvent extracted oil cakes on the productive capacity and well being of animals. This problem assumes special importance in India, as quite often our animals subsist on cereal straws which are poor in fat content.

It was, therefore, decided to study the nutritive value of oil cakes pressed by ghani, expeller and solvent extraction processes and their long range effect on milk yield and fat production.

(a) *Mustard (Brassica campestris) cake prepared by (i) ghani (ii) expeller and (iii) solvent extraction processes*

12 Haryana cows were divided into three groups, comparable with respect to age, number and stage of lactation, containing 4 cows each. The weekly milk yield (whole and fat corrected), fat percentage of two days at zero week and weekly total fat in the three groups were about the same at the time of grouping. The first group was given a concentrate mixture consisting of 50 parts solvent extracted mustard cake, 10 parts crushed barley, 10 parts crushed gram and 30 parts gram husk. In the concentrate mixtures of the other two groups, solvent extracted cake was replaced by expeller pressed and ghani pressed cakes respectively. The digestible crude protein content of all the three concentrate mixtures was the same.

After about three months of feeding, a metabolism trial was conducted.

The fat levels of the rations in the solvent, expeller and ghani groups worked out to be 0.94, 2.15 and 3.84 respectively.

The digestibility coefficients of the rations containing solvent extracted, expeller pressed and ghani pressed mustard cakes respectively were 64.90, 67.72 and 66.46 for crude protein; 47.12, 68.79

and 77.90 for ether extract and 55.96, 56.56 and 56.86 for total carbohydrates.

It was seen that there was no significant variation in the digestibility coefficients of the various constituents in the three groups except ether extract.

The balances for calcium, phosphorus and nitrogen were positive in all the three groups.

The daily milk yield was recorded and milk was analysed for its fat content, biweekly. The experimental feeding continued for a period of 38 weeks.

Average milk yield, butter fat and fat corrected milk (at 4 per cent.) during the experimental period for the solvent extracted, expeller pressed and ghani pressed cake groups were respectively 1970, 1350 and 2001 lbs; 108, 82 and 118 lbs. and 2407, 1769 and 2566 lbs.

The values for milk yield, butter fat and fat corrected milk appear to be highest in case of ghani pressed cake groups and lowest in the case of expeller pressed cake group. It was noticed that most of the animals in the expeller pressed group were in milk for 22 weeks only as compared with 31 and 30 weeks in the case of the solvent and ghani pressed cake groups respectively. One of the reasons of this short period of lactation, besides other factors, might be that these animals conceived earlier than those in other groups. The differences, however, do not appear to be significant.

(b) *Linseed (Linum sitaticissimum) cake prepared by (i) ghani, (ii) expeller and (iii) solvent extraction processes*

15 Haryana cows were divided into 3 groups comparable with respect to age, number and stage of lactation. Weekly milk yield, whole and fat corrected milk, fat percentage and weekly total fat in the three groups were about the same at the time of grouping. The first group was fed a concentrate mixture consisting of 50 parts solvent extracted linseed cake, 10 parts crushed barley, 10 parts crushed gram and 30 parts gram husk. In the 2nd and 3rd groups solvent extracted linseed cake was replaced by expeller and ghani pressed linseed cake respectively. The digestible crude protein content of all the three concentrate mixtures was the same. The roughage fed to all the three groups was the same.

After a preliminary feeding of 8 weeks, a metabolism trial was conducted.

The fat levels of the ration in solvent extracted expeller pressed and ghani pressed cake groups were 1.13, 3.62 and 4.02 respectively.

The digestibility coefficients of the ration containing solvent extracted, expeller pressed and ghani pressed linseed cakes were respectively 57.45, 56.57 and 57.65 for crude protein; 72.30, 78.40 and 78.63 for ether extract and 56.97, 58.73 and 59.37 for total carbo-hydrates.

The digestibility of ether extract increased with the increase in the fat level in ration. There was no significant variation in the digestibility of any of the constituents.

The balances for calcium, phosphorus and nitrogen were positive in all the three groups.

The daily milk yield was recorded and milk was analysed for its fat content biweekly. The experimental feeding remained for 36 weeks.

Average milk yield, butter fat and fat corrected milk (at 4 per cent.) in lbs. during the experimental period for the solvent extracted, expeller pressed and ghani pressed groups were respectively 1311, 1413 and 1645; 72, 72 and 84 and 1586, 1630 and 1936.

The values for milk yield, butter fat and fat-corrected-milk were highest in case of ghani pressed cake groups. The differences, however, do not appear to be statistically significant. When the data with regard to milk yield, total fat and fat-corrected-milk and linseed cakes was pooled to get an overall picture it was observed that (i) the total fat production was higher in case of ghani pressed cake group as compared to the other two groups, the combined result tending to approach significance and (ii) milk yield and fat-corrected-milk also showed similar trends, but the variations did not show significance.

IV. FAT REQUIREMENT OF CATTLE

No specific information is available on the fat requirement of cattle. An investigation was, therefore, undertaken to study whether or not fat is required for (1) adult non-producing bullocks (2) growing calves and (3) milch cows.

Adult non-producing bullocks

Four sets of experiments were conducted on adult hill bullocks.

The first three experiments were conducted on nine animals each divided into three comparable groups of three each; whereas, in the 52 C.P.—6.

fourth experiment 12 animals were divided into three groups of 4 animals each. The rations were so devised that although the percentage of fat differed from group to group, the stipulated ingestion of protein and energy was in accordance with Morrisons standard. In the first two experiments, crude groundnut oil was added in different amounts to basal rations, and in the last two experiments solvent extracted, expeller pressed and ghani pressed til and linseed cakes were used for varying the fat percentage of the ration in different groups. The average fat level of the ration in the three groups of each experiment were 0.94, 3.53 and 9.70 per cent.; 172, 3.97 and 632 per cent.; 1.15, 2.00 and 3.48 per cent.; and 0.78, 2.22 and 3.54 per cent. respectively in the four experiments.

The digestibility of ether extract in the different groups of each experiment was respectively 36.66, 76.11 and 80.50 per cent.; 63.3, 80.3 and 88.9 per cent.; 58.2, 73.9 and 76.0 per cent.; and 46.83, 73.07 and 78.72 per cent. in the four experiments, while that of crude protein was 38.15, 45.65 and 60.41 per cent.; 51.1, 54.7 and 62.0 per cent.; 52.0, 53.6 and 55.0 per cent. and 49.00, 52.40 and 56.99 per cent. respectively. It will be seen that the digestibility of ether extract in all the four experiments increased with the increase in the fat level of the ration and the differences were found to be statistically significant. Similar trend was shown by crude protein, although the differences were not found to be statistically significant in two out of the four experiments. The pooled values of these two experiments, however, showed a significant difference in the crude protein digestibility.

The variation in the total digestible nutrients (TDN) at different levels of fat was studied. A multiple regression of log TDN on fat content of the ration and the body weight of the animal was fitted. The data from the first two experiments were utilised for this purpose. The equation expressing the relationship of log TDN (Y) with fat content (X_1) and log body weight (X_2) was as follows $Y = -0.7322 - 0.0323X_1 - 0.9894X_2$. A value of 0.96 was obtained for R^2 (R = multiple regression coefficient) showing that as much as 96 per cent. of the variation in TDN could be accounted for by the relationship worked out above. By testing the mean square attributable to the joint regression on fat content (X_1) and its square (X_{12}), it was confirmed that in this case the TDN consumption varied significantly with fat content.

In the other two experiments, both unadjusted log TDN and log TDN adjusted for variations in body weight through covariance in the different groups were compared by the analysis of variance.

The results showed that at all levels of fat in the ration lying between 0.78 to 6.32 per cent., the animals have been ingesting more TDN than what is required for maintenance in accordance with Morrison's standard. The lowest level is much lower than that obtaining in the usual farm rations and the highest one is much higher. As such it appears that under normal conditions of feeding the fat requirement of these animals for maintenance is always likely to be met.

Growing calves

Five sets of experiments were conducted wherein each set consisted of three groups of three Hariana bull calves each. Crude groundnut oil was used to vary the levels of fat in the ration. These rations were so computed that, whereas, the ingredients remained the same in each experiment, their proportions were so varied that although differing in their fat contents, the rations provided equal amount of TDN per unit of dry matter. The average percentage of ether, extract, in the three groups of each experiment was 2.11, 5.31 and 8.17, 2.05, 5.07 and 6.30; 1.25, 3.55 and 7.98; 1.90, 2.60 and 6.49 and 2.17, 3.02 and 4.16.

The average digestibility of ether extract in the three groups in each of the five experiments was respectively 56.4, 76.8 and 84.25, 61.5, 80.4, 80.4, 80.4; 80.1, 82.6 and 89.7; 67.1, 82.3 and 91.2 and 52.7, 56.9, and 75.4%. It will be seen that the digestibility of ether extract was found to increase with increase in the fat level of the ration. The digestibility of dry matter was not affected by the percentage of fat in the ration.

The balances of calcium, phosphorus and nitrogen were positive in all the five experiments. The balances of nitrogen in three experiments where the same basal concentrate mixture was used exhibited a decreasing trend with increase in fat level of the ration. In one of the remaining two experiments, the nitrogen balances showed an opposite trend whereas in the last experiment the balances showed no specific trend. The basal concentrate mixture was different from each other in these two experiments. It appears, therefore, that the compositions of the basal ration is a factor in determining the effect of fat on nitrogen retention.

The relationship between TDN consumption and the fat content of the ration was studied by fitting a multiple regression of log TDN (Y) on fat content (X_1) log body weight (X_2) and growth rate (X_3). The retention could be adequately expressed by a liner multiple regression equation viz.

$Y = 1.596 - 0.0102X_1 - 0.6980X_2 - 0.0355X_3$, which gave a negative correlation between TDN and fat content which was significant at 1% level. This indicates that within the range of 1.25% to 8.17% of fat studied in these experiments, an increase in fat content of feed is accompanied by a decrease in TDN consumption. The actual legestion of TDN in all the animals, however, was according to the usually accepted standards. The lowest fat level studied in all these experiments is much lower than and the highest level much higher than usually obtaining in all practical farm rations for growing animals. It appears therefore, that the requirement of growing animals would be adequately met under usual farm feeding conditions.

Milch cows

Two sets of experiments were conducted, each on 12 milch cows, divided into three groups of four animals each. The animals were fed protein and energy on the basis of Morrison standard. The rations were so devised that although they differed in their fat content, the stipulated ingestion of protein and energy was in accordance with the Morrison standard. Crude groundnut oil was used to vary the fat level of the ration. The ration in both the experiments was so computed that although differing in fat content, the stipulated ingestion of TDN was same per unit of dry matter consumption of similar animals in different groups. The average fat level in the three groups of each experiment was 1.02, 1.76 and 3.11; and 2.73, 3.49 and 4.54 per cent.

The digestibility of ether extract was observed to increase with increasing fat level of the ration the average figures being 56.56, 76.19 and 83.92; and 80.56, 82.97 and 86.56 per cent. in the two experiments respectively. The digestibility of other nutrients remained unaffected.

The variation in TDN consumption with fat percentage of the ration was studied by fitting a multiple regression of log TDN (Y) on fat content (X_1), fat corrected milk yield (X_2) and log body weight (X_3). The relationship was as follows:—

$Y = 2.6681 - 0.0028X_1 - 0.2827X_2 - 0.0166X_3$. The partial correlation of log TDN on fat content was not significant. The above results indicated that within the range of 1.02 to 4.54 per cent. the content of the ration did not affect the consumption of TDN. It was further observed that at all levels of fat intake studied, the TDN requirement was met for maintenance and milk production according to Morrison's standard.

V. STUDIES ON THE NUTRITIVE VALUE OF COTTONSEED AND COTTONSEED CAKE AND THEIR EFFECT ON MILK AND FAT PRODUCTION.

Cottonseed is one of the most important oil seeds produced in India its annual production being estimated at about one million tons. The seeds and the two forms of cake produced by extracting the oil *viz.* decorticated and undecorticated are used extensively for feeding cattle. Cottonseed as such is specially valued for milch cows and buffaloes under the belief that it increases the fat content of the milk. However no conclusive information is available either on the comparative nutritive values of cottonseed and cottonseed cakes or on their effect on milk and fat production. Therefore, the following experiments were undertaken.

(a) *Comparative nutritive value of cottonseed, cottonseed cake (decorticated) and cottonseed cake (undecorticated)*

18 adult Kumaoni bullocks were divided into 3 comparable groups of 6 each. The digestible crude protein requirements of experimental animals were met by cottonseed in one group, cottonseed cake (decorticated) in 2nd group, cottonseed cake (undecorticated) in 3rd group. Wheat bhoosa fed *ad lib* constituted the roughage in all the three groups. The rations were fed for about a month and during the last 10 days a metabolic trial was conducted.

The fat levels in the total rations worked out to be 4.73, 1.44 and 2.42 for cottonseed, cottonseed cake (decorticated) and cottonseed cake (undecorticated) respectively.

The average digestibility coefficients for cottonseed, cottonseed cake (decorticated) and cottonseed cake (undecorticated) were respectively 43.7, 47.2 and 46.4 for crude protein, 89.7, 84.2 and 76.4 for ether extract and 50.4, 52.2 and 52.0 for total carbohydrates.

No significant differences were observed in the digestibility of any of the constituent.

The digestible crude protein in lbs. of cottonseed, cottonseed cake (decorticated) and cottonseed cake (undecorticated) was 12.95, 28.19 and 19.16 per 100 lb. of dry material respectively.

The average TDN in lbs. of total rations, consumed per 100 lb. dry material worked out to be 52.2, 48.3 and 49.3 respectively and ingested per 100 lb. body weight, were, 462, 591 and 567 gms. for cottonseed, cottonseed cake (decorticated) and cottonseed cake (undecorticated). The differences were not found to be significant.

The balances for calcium, phosphorus and nitrogen were positive in all the three groups.

(b) *Effect of feeding (i) cottonseed, (ii) cottonseed cake and (iii) dairy mixture on digestibility and proximate principles, milk yield and fat production in cows*

Three sets of experiments to study the comparative effect of feeding cottonseed, cottonseed cake and dairy mixture on the digestibility of proximate principles, milk and fat production were conducted on 12, 18 and 15 cows.

The cows in the three experiments were divided into 3 groups having equal number of animals in each group comparable with respect to age, number and stage of lactation. Weekly milk yield (whole and fat corrected), fat percentage and weekly total fat in the three groups were about the same at the time of grouping. Group I received a dairy mixture consisting of linseed cake, barley and gram husk. In Group II and III 50 per cent. of digestible crude protein of the concentrate mixture was replaced by cottonseed and cottonseed cake respectively. Starch equivalent of the 3 mixtures was kept the same. Roughage fed to the three groups was the same.

Experiment I

After about 3 months of experimental feeding, a metabolism trial was conducted.

The fat levels of the rations in dairy mixture, cottonseed and cottonseed cake groups were 1.82, 3.33 and 1.99 per cents. respectively.

The average digestibility coefficient of dairy mixture, cottonseed mixture and cottonseed cake mixture groups were respectively 55.6, 53.5 and 55.2 for crude protein 66.4, 79.8 and 67.6 for ether extract and 60.3, 59.0 and 59.1 for total carbo-hydrates.

The digestibility of ether extract increases with the increase in the fat level of ration.

The balances for calcium, phosphorus and nitrogen were positive in all the three groups.

The daily milk yield was recorded and milk was analysed for its fat content at regular intervals. The experimental feeding continued for 24 weeks.

Average milk yield, butter fat and fat-corrected-milk (at 4%) in lbs. for dairy mixture, cottonseed and cottonseed cake group

during the experimental period were respectively 984.4, 1056.4 and 1235.5; 47.98, 58.58 and 59.76 and 1027.9, 1196.9 and 1310.4.

The values for milk yield, butter fat and fat corrected milk were highest for cottonseed cake group and lowest for dairy mixture group.

Experiment 2.

After about 5 months of feeding, a metabolism trial was conducted.

The fat percentage in the rations in dairy mixture cottonseed and cottonseed cake groups were 2.52, 4.28 and 2.68 respectively.

The average digestibility coefficients for dairy mixture, cottonseed and cottonseed cake mixture groups were respectively *0.60, 55.14 and 57.70 for crude protein, 76.10, 80.93 and 76.10 for ether extract and 56.58, 51.20 and 58.35 for total carbo-hydrates. The digestibility of ether extract showed a similar trend as was observed in experiment 1.

The balances for calcium, phosphorus and nitrogen were positive in all the three groups.

The daily milk yield was recorded and milk was analysed for its fat content at regular intervals. Experimental feeding continued for a period of 34 weeks.

The average milk yield, butter fat and fat-corrected-milk (at 4%) in lb. for dairy mixture cottonseed and cottonseed cake mixture groups were respectively 1374.7, 1264.7 and 1186.2; 67.56, 64.13 and 60.83 and 1557.5, 1499.3 and 1389.8.

The values for milk yield, butter fat and fat-corrected-milk were highest for dairy mixture group and lowest for the cottonseed cake group.

Experiment 3.

After about 5 months feeding, a metabolism trial was conducted.

The fat levels of the rations in dairy mixture, cottonseed and cottonseed cake mixture groups were 1.52, 3.16 and 1.59 respectively.

The digestibility coefficient for dairy mixture, cottonseed mixture and cottonseed cake mixture groups respectively were 57.48, 60.21 and 50.79 for crude protein; 64.91, 74.16 and 72.39 for ether extract and 60.11, 62.26 and 59.12 for total carbo-hydrates.

The digestibility of ether extract increased with increase in fat level of the ration confirming the trends of experiment 1 and 2.

The balances for calcium, phosphorus and nitrogen were positive in all the three groups.

The daily milk yield was recorded and milk was analysed for its fat content biweekly. Experimental feeding continued for 38 weeks.

The average milk yield, butter fat and fat corrected milk (at 4%) for dairy mixture, cottonseed and cottonseed cake groups were respectively 1883.6, 1459.5 and 1926.4; 83.79, 71.59 and 95.89 and 2016.61, 1657.90 and 2220.83.

The values for milk yield, butter fat and fat-corrected-milk are highest for cottonseed cake group followed by dairy mixture and cottonseed in a descending order.

Summing up the results of the three experiments, it was noticed that:

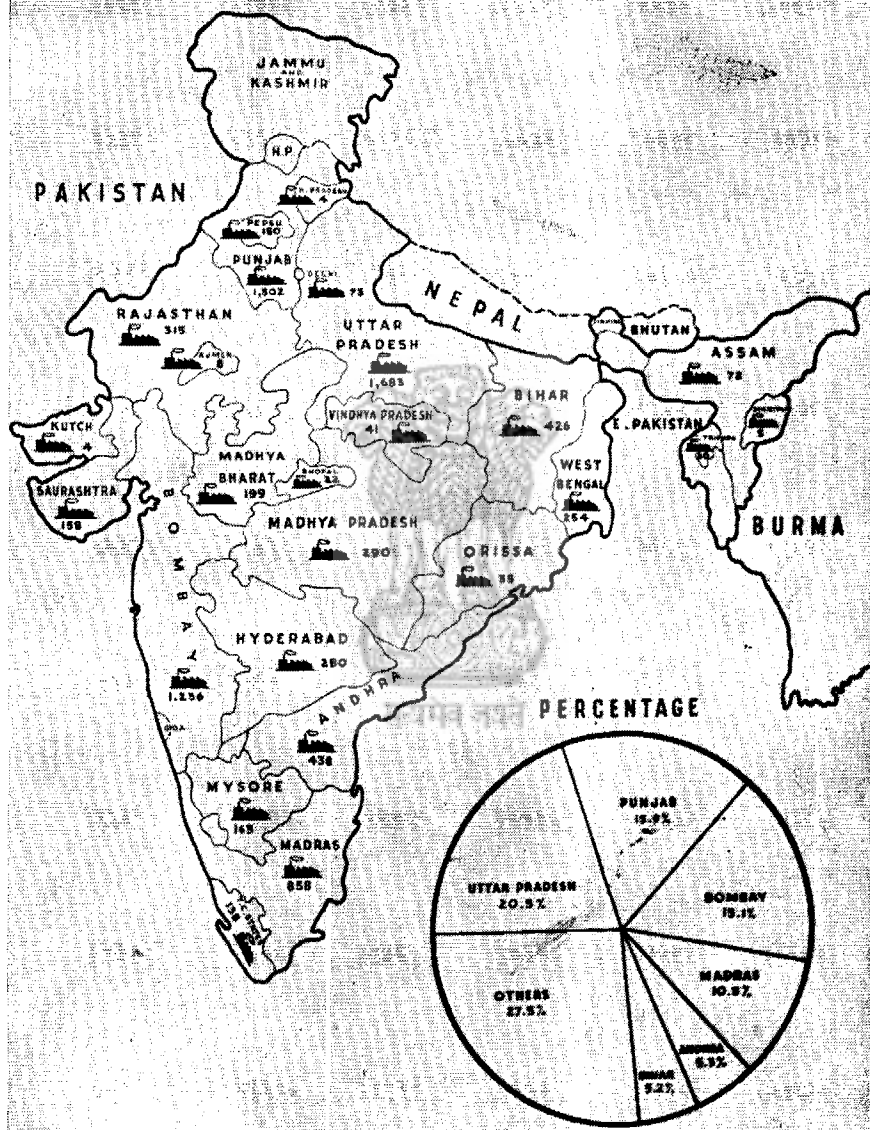
- (a) the digestibility of ether extract showed a trend, being highest in cottonseed group followed by cottonseed cake and dairy mixture groups in a descending order. The differences were found to be significant only in 2 out of 3 experiments. The digestibility of crude protein and total carbo-hydrates, did not show any particular trend. The variations in the digestibility were significant in 2 out of 3 experiments in case of crude protein and only in one experiment in case of total carbo-hydrates.
- (b) Data on milk yield and fat production of the three experiments when pooled to get an overall picture, showed an actual but not significant increase in total fat production in cottonseed group as compared to other 2 feed groups, whereas values for milk yield and fat-corrected-milk were lowest for cottonseed group and highest for cottonseed cake group. The differences again were not significant.

VI. CHEMICAL COMPOSITION OF OIL CAKES PREPARED BY GHANI, EXPELLER AND SOLVENT EXTRACTION PROCESSES AS AFFECTED BY STORAGE.

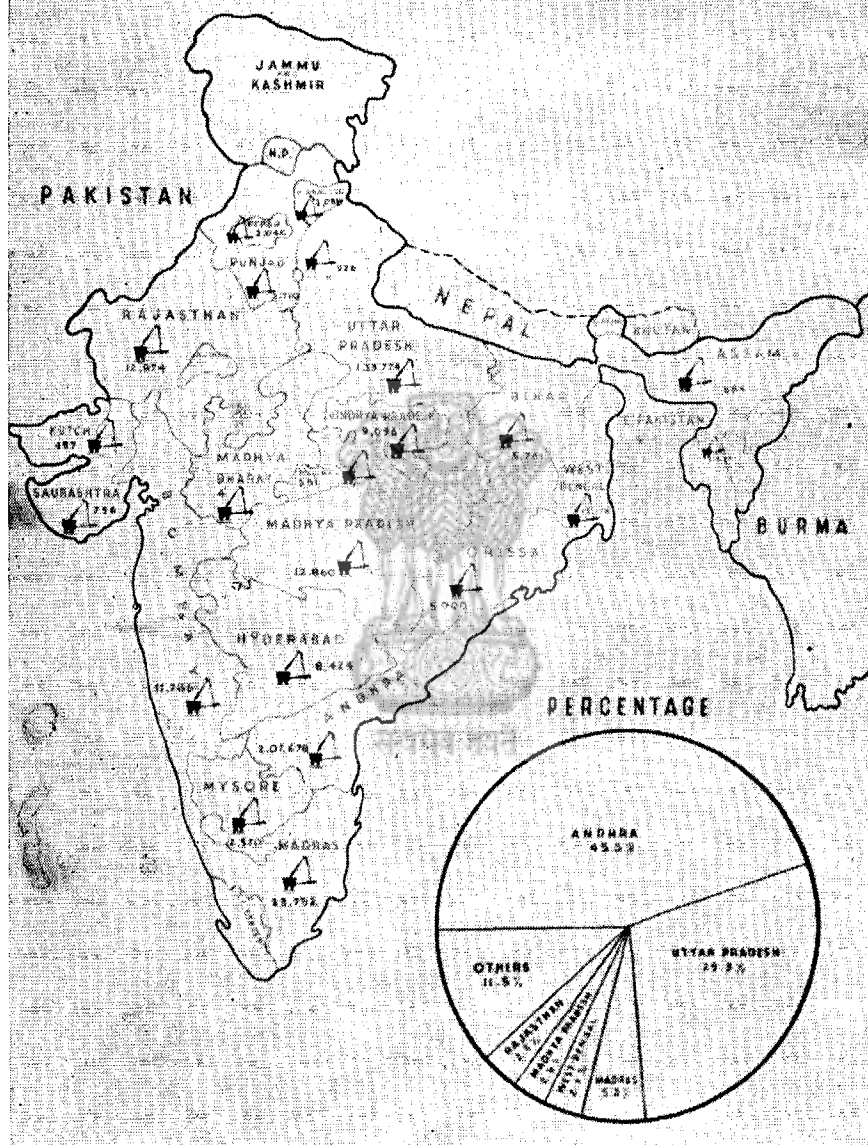
It is well known that feeding stuffs deteriorate in quality under ordinary conditions of storage.

The principal causes of this spoilage are the growth of micro-organism chiefly bacteria, yeast and moulds; the action of enzymes,

MAP SHOWING ^{The} DISTRIBUTION OF OILMILLS IN THE DIFFERENT STATES OF INDIA



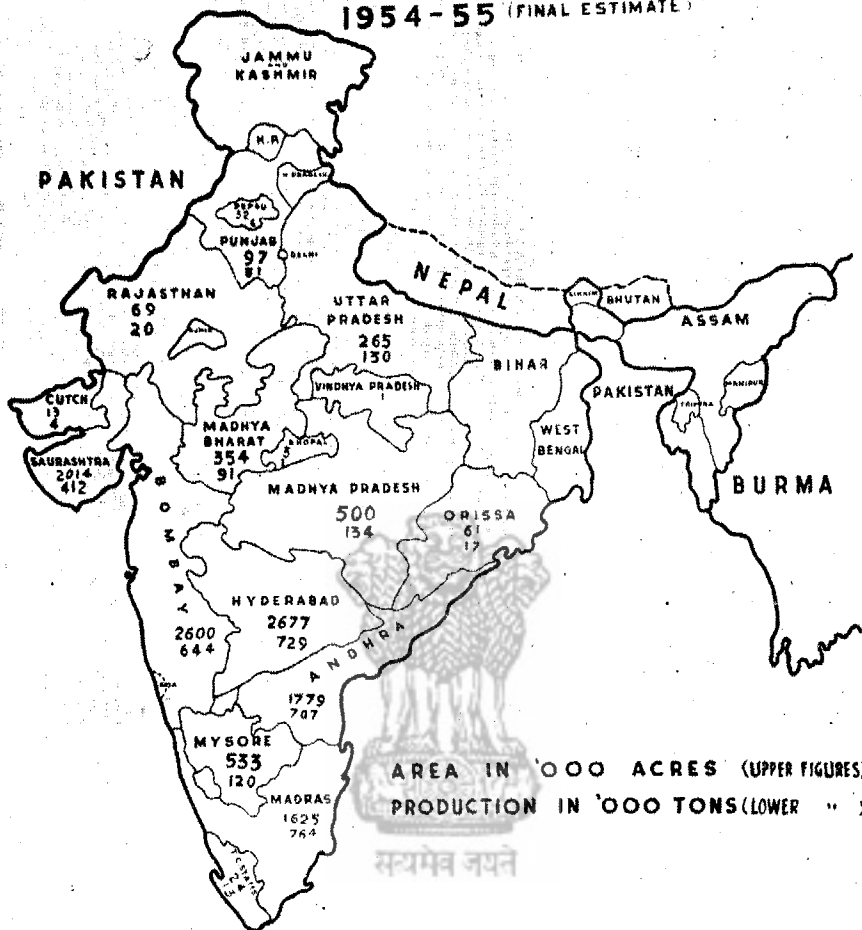
MAP SHOWING *The* DISTRIBUTION OF GHANIS KOHLU IN THE DIFFERENT STATES OF INDIA



AREA & PRODUCTION OF GROUNDNUT

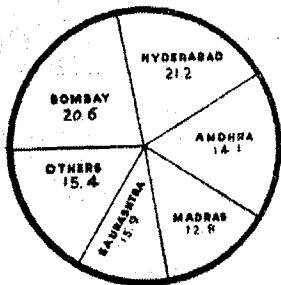
NUTS
IN SHELL

1954-55 (FINAL ESTIMATE)

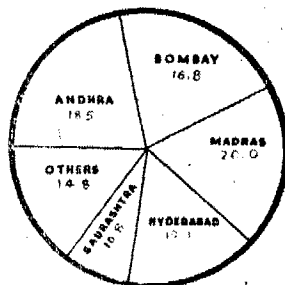


AREA IN '000 ACRES (UPPER FIGURES)
PRODUCTION IN '000 TONS (LOWER ")

सत्यमेव जयते



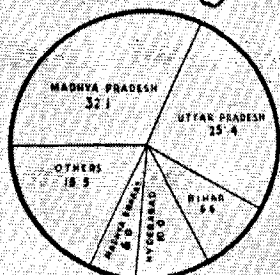
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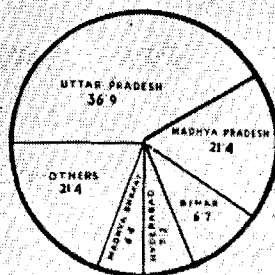
PRODUCTION

AREA & PRODUCTION OF LINSEED

DURING 1954-55 (FINAL ESTIMATE)



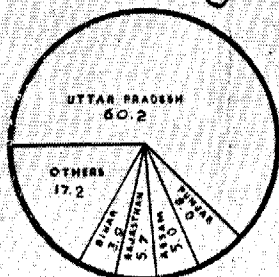
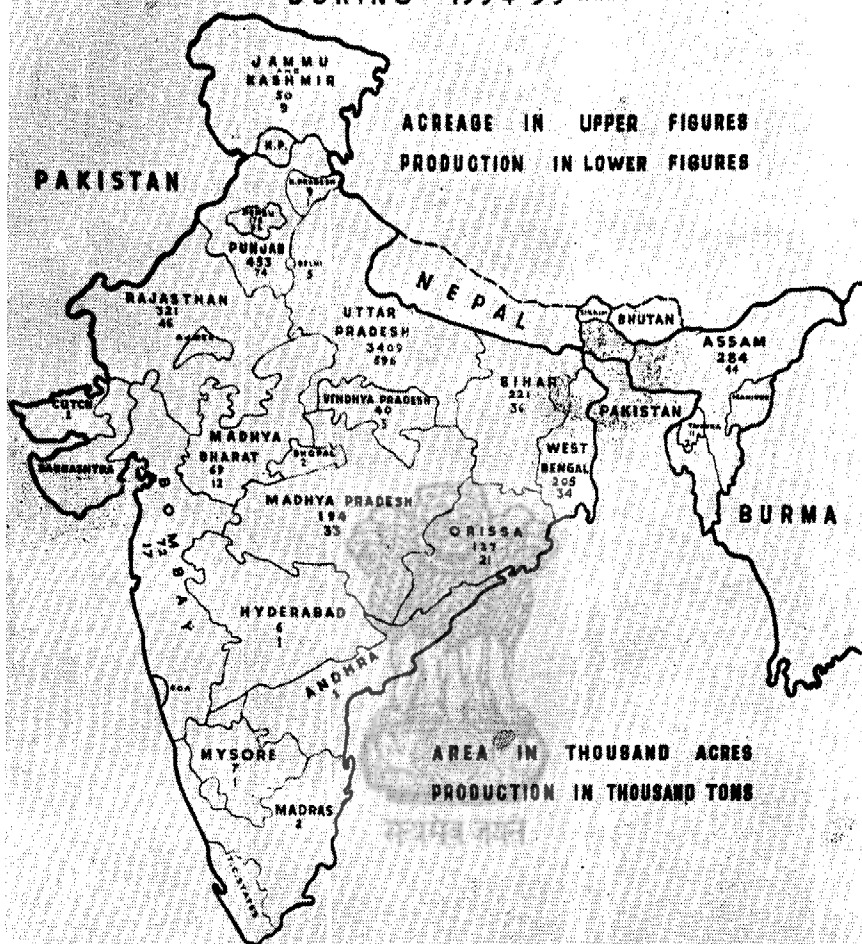
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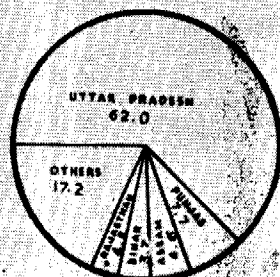
PRODUCTION

AREA & PRODUCTION OF RAPE AND MUSTARD

DURING 1954-55 (FINAL ESTIMATE)



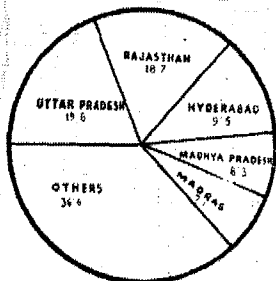
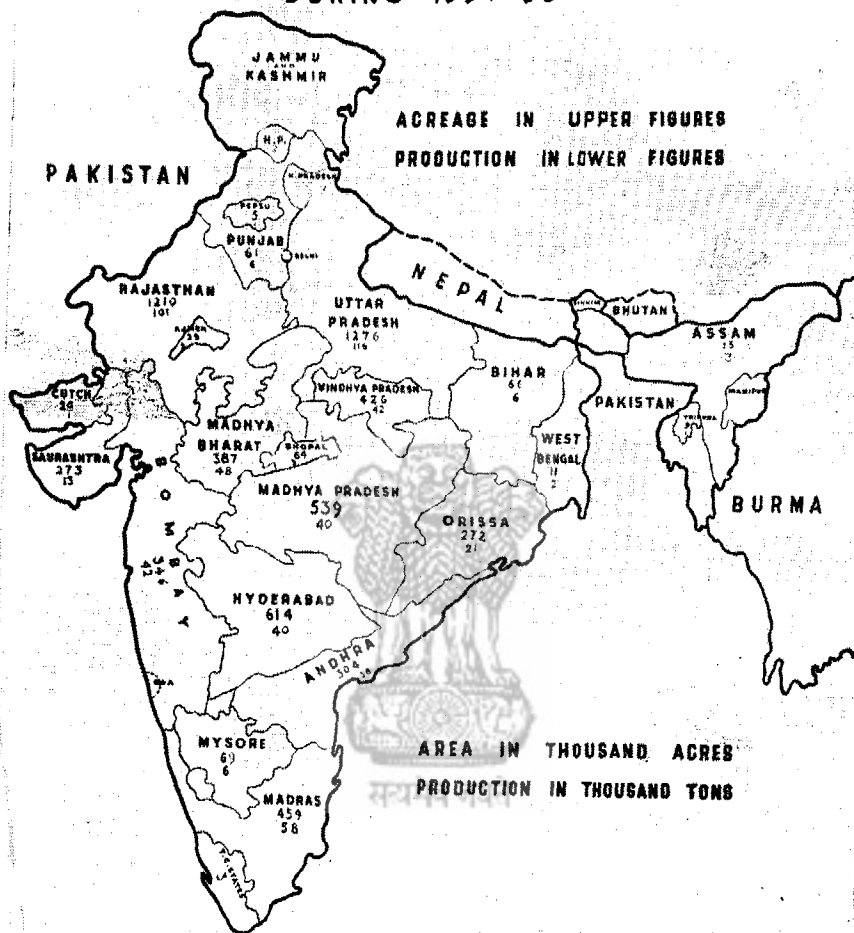
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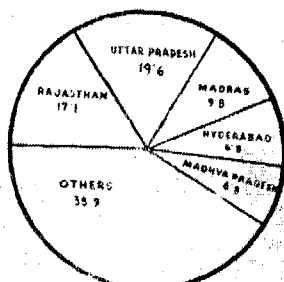
PRODUCTION

AREA & PRODUCTION OF SESAMUM

DURING 1954-55 (FINAL ESTIMATE)



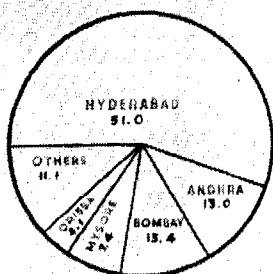
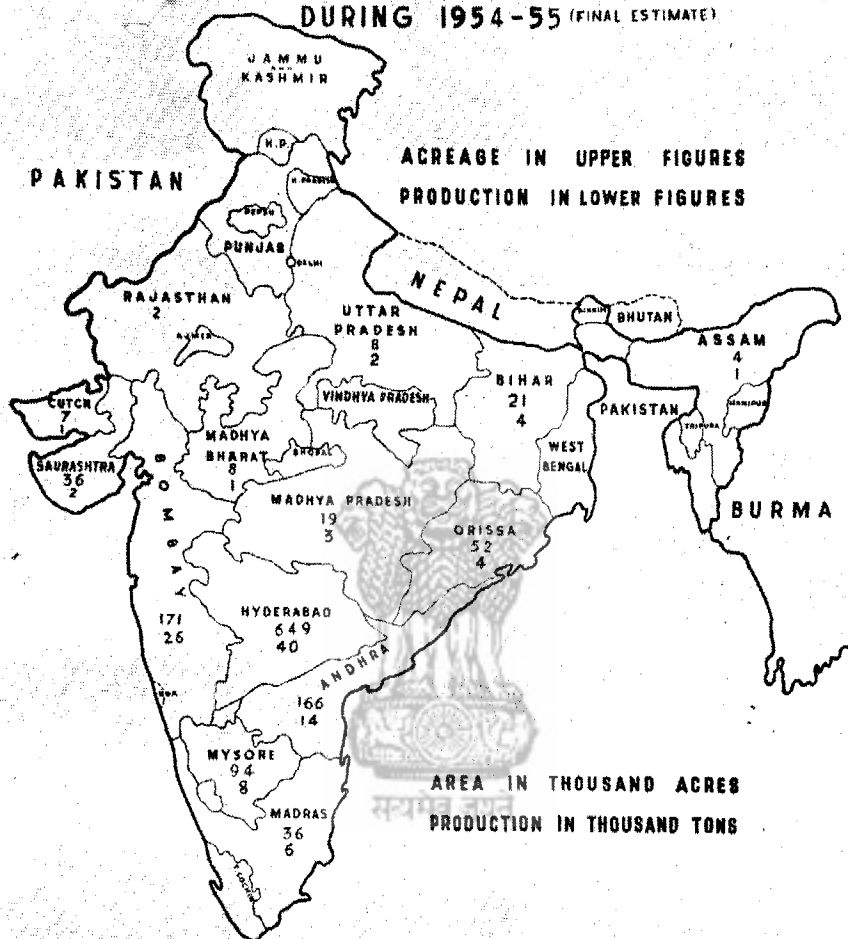
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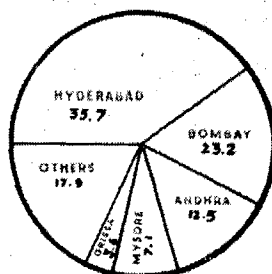
PRODUCTION

AREA & PRODUCTION OF CASTOR

DURING 1954-55 (FINAL ESTIMATE)



ACREAGE



PRODUCTION

which occur naturally in the feeds; and chemical reactions such as oxidation and hydrolussis.

In view of the fact, that cattle feeds have to be stored and stocked for sufficiently long periods, it was felt desirable to study comparative effect of storing oil cakes pressed by ghani, expeller and solvent extraction processes on their chemical composition under conditions commonly obtained in the country.

Four types of cakes viz. til (*sesamum indicum*), mustard (*brassica campestris*), groundnut (*arachis hypogaea*) and linseed (*linum sitaticissimum*) were prepared by ghani expeller and solvent extraction processes out of a pooled stock of seeds. The different oil cakes were stored in gunny bags and kept in the godown and random samples were drawn at monthly intervals during the first year and every alternate month during the second year. The samples were analysed for their chemical composition. It was observed that:—

- (a) In case of solvent extracted cakes, chemical composition did not appear to be materially affected storage except in the case of til cake, where a decrease in ether extract accompanied by minor changes in total carbohydrates was observed for the first four months.
- (b) As regards, ghani and expeller pressed cakes, same trend was noticeable in both the cakes, i.e., ether extract decreased with consequent increase in total carbohydrates upto a certain period and thereafter the values remained constant. The periods upto which changes occurred were respectively for groundnut, til, mustard and linseed 5, 12, 12 and 12 months for ghani cakes and 4, 11, 6 and 12 months for expeller pressed cakes.

It, therefore, appears that the constituent mainly affected during the storage of oil cakes is ether extract which decreases with consequent increase in the total carbohydrates.

VII. TOXICITY OF ARGIMONE OIL

One of the causes of the epidemic dropsy in man is considered to be the adulteration of mustard oil with argimone oil. In this investigation it was desired to find out the tolerance limit of the argimone oil in mustard oil.

24 male and 18 female rats at weaning were divided into 6 groups of 4 and 3 rats respectively in each group.

The synthetic basal diet was supplemented with different quantities of argimone oil varying from 0.5 c.c. to 8.0 c.c. in the mustard

It appears that the presence of argimone oil from 1.0 c.c. onward in the diet limits the intake of nutrients which may be the immediate cause of the slower rate of growth. Later on, after 24 weeks, due to malnutrition, the clinical symptoms developed and the animals were susceptible to various types of diseases especially diarrhoea and pneumonia.

Records of weekly body weight, clinical condition, mortality, reproductive performance, decrease with and feed consumption were maintained.

The retarded rate of growth decrease with the increased concentration of the argimone oil and the differences were conspicuous after 10-11 weeks on these diets. Though the animals of different groups showed slower rate of growth in comparison with the control yet the clinical conditions and mortality were not recorded till 24 weeks. The females of control, 0.5 c.c. and 1.0 c.c. groups only were capable of producing litters. The higher supplemented groups showed less ingestion of feed.

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NOTE OF DISSENT TO THE REPORT OF THE OILSEEDS CRUSHING INDUSTRY INQUIRY COMMITTEE, 1956, BY DR. K. S. MURTI (PRINCIPAL, OIL TECHNOLOGICAL INSTITUTE, ANANTAPUR), MEMBER, OILSEEDS CRUSHING INDUSTRY INQUIRY COMMITTEE.

I am unable to subscribe wholly to the views of my colleagues, particularly on the following:—

1. A survey of the existing state of Oilseeds Crushing Industry in the country is not dealt with adequately in the main Report.
2. The general lines on which this industry should be developed in future are not sufficiently dealt with in the main Report and extraction of oil from seeds and cakes altogether omitted.
3. Regarding the superiority of the nutritive and keeping qualities of ghani oil compared with the mill oil.
4. Regarding both the installed and utilised capacities and the employment potential of the village ghanis and the mills.
5. On the less oil produced by ghanis.
6. Regarding the approach to the development of cottonseed crushing industry.

I may set out, briefly, my views on the above points.

1. A SURVEY OF THE EXISTING STATE OF OILSEEDS CRUSHING INDUSTRY IN THE COUNTRY

One of the terms of reference of the Committee is "to carry out a rapid survey of the state of Oilseeds Crushing Industry (crushing both by mills and by village ghanis) in the country". But the survey made is not adequately recorded in the main Report. I consider that this should be stated fully, though briefly, at one place, so as to give a clear picture of it. I, therefore, give it below:

The major oilseeds produced in the country are groundnut, cottonseed, rape and mustard, sesame, coconuts (copra), linseed and castor, in the decreasing order of production. The more important minor oilseeds produced in India are Karanji, Neem, Niger, Mowrah, Safflower (Kardi), tobaccoseed, Poppy, sam and Ambadi, also in the decreasing order of production. The total estimated production of the major oilseeds for the year 1954-55 is 79.50 lakh tons and that of the minor oilseeds 3.11 lakh tons.

While practically all States produce significant quantities of one or more oilseeds, the important major oilseed producing States are Andhra, Bombay, Hyderabad, Madras, Madhya Pradesh, Saurashtra and Uttar Pradesh.

Number of Power Mills and Ghanis

There are no accurate statistics available regarding the number of power mills and ghanis installed and working at present. Varying estimates of these are, however, made by different bodies at different times. According to an estimate of Indian Central Oilseeds Committee, the number of oil mills in the country is 8,201. It is also estimated by this body that there are 3,475 expellers, 16,432 rotary ghanis (power driven), 153 hydraulic presses and 4,836 other power ghanis. According to the recent report of the Taxation Enquiry Commission there are about 1,050 large mills and 8,600 small mills using power driven ghanis and screw presses. As regards the number of ghanis in the country, different estimates are also made. According to the Livestock Census of 1951, there were in that year 4,46,436 ghanis, with 2,04,006 ghanis having 5 seers capacity and 2,42,430 ghanis having more than 5 seers capacity. According to the Taxation Enquiry Commission and all-India Khadi and Village Industries Board, there are about 4 lakhs of ghanis. It is also estimated that there are 1,960 Wardha Ghanis with 10 seers crushing capacity each. However, it is not known definitely how many of these mills or the ghanis are actually working regularly.

In addition to the above mills and ghanis, there are six solvent extraction plants working at present, having a total capacity of about 200 tons of oil cakes per day. Besides these, six more plants are reported to be under erection and will come into operation shortly.

Based on the estimates of the Indian Central Oilseeds Committee, the total installed crushing capacity of all the power mills, on three shift basis, is about 92.7 lakh tons per year, *vide* Appendix L to the main Report. The total installed capacity of all the ghanis (on the

normal charges of 3 per day for village ghanis and 5 charges per day for Wardha ghanis) is 19.4 lakh tons per year *vide*, Appendix K of the main Report. Thus the total installed crushing capacity of the existing mills and the ghanis (112 lakh tons) far exceeds the total production of major and minor oilseeds (82.6 lakh tons) in the country. However, it is estimated by the Indian Central Oilseeds Committee that only 20.7 lakh tons of oilseeds are crushed by power mills i.e., 22.4 per cent. of the installed capacity. 11.9 lakh tons of oilseeds are crushed by ghanis annually (*vide*, Appendix A to this note), as furnished by All-India Khadi and Village Industries Board, i.e., 61.3 per cent. of the installed capacity. Further, it is estimated that only 37.0 per cent. of the total oilseeds produced are crushed for oil at present. This indicates that there is considerable scope for increasing the crushing of oilseeds in the country.

It is a feature of the oilseeds crushing industry in India that quite frequently many mills and ghanis are either closed down indefinitely or are not operated for the time being owing either to lack of parity between the prices of oilseeds and the corresponding oils, non-availability of oilseeds in the vicinity, lack of adequate and proper storage facilities, violent fluctuations in prices or due to other economic causes.

The following factors, among others, seems to contribute to the above state of affairs:

Mills

(i) A large number of mills have sprung up haphazardly and indiscriminately, without any proper planning or organisation prior to, during and after the Second World War. This resulted in over expellerisation and the consequent non-utilisation of much of the installed capacity of mills.

(ii) Most of the mills are small units with 1—3 expellers or 2 to 6 power driven rotaries, run inefficiently by persons without possessing any adequate technical knowledge of the processes involved.

(iii) Adequate control of the processing and the products obtained is rarely enforced in a vast majority of the mills, including many of the larger units, by means of proper testing and other laboratory controls.

This lack of quality control is borne out by the analysis of large number of mill oil cakes carried out at the Oil Technological Institute, Anantapur and furnished to the Committee. From this

information, it is quite evident that the oil contents of the expeller and rotary mill produced cakes are high and hence yields of oil from the seeds low, comparing unfavourably with those obtained in leading Western countries.

(iv) There is a lack of flexibility of the mills to crush different kinds of seeds. The existing mills were mostly planned and erected to crush a single type of oilseed though some mills do crush more than one seed. The mill works as long as this seed is available and remains mostly idle when the season for that particular oilseed is over, incurring idle overhead and depreciation expenses. Should the mills be equipped with preparatory and other equipment suitable for treatment of the different oilseeds produced in different seasons in the vicinity of its location, they could work practically throughout the year.

(v) The equipment used by mills in many cases is very old and worn out and not always properly maintained in good repair by timely replacements, etc. This results in inefficient performance by the mills and lower yields of oils.

Ghanis

(i) The most serious drawback of the village ghanis is its comparative inefficiency of production of oil which is considerably lower than in the case of power mills, particularly expellers. This lack of efficiency is evident from the higher percentage of oil left in the cake as shown by the analysis of a large number of ghani cakes carried out at the Oil Technological Institute, Anantapur (*vide*, Appendices H, I and J of the main Report) and elsewhere.

(ii) The outturn of the ghanis per day is very low, apart from their inefficient operations.

(iii) The oil obtained by ghanis contains more moisture and suspended and mucilaginous impurities than mill oil.

(iv) The sanitary conditions under which the ghanis work are most unhealthy and require immediate improvement.

2. THE GENERAL LINES ON WHICH THE INDUSTRY SHOULD DEVELOP

One of the terms of reference of the Committee is "to recommend the lines on which this industry should be developed in future". While detailed consideration with particular reference to the ghani crushing *vis-a-vis* mill crushing is given in the main Report, the general lines on which both the mills and ghani crushing of oilseeds should be developed is not dealt with, nor any consideration given to

the important subject of extraction of oils from seeds and cakes by use of solvents. I, therefore, consider it necessary to include a note on the general lines of development of this industry, particularly, on the technological aspects.

Oil mills

(i) The average mills should be made aware of the various improved methods of processing followed in the more advanced countries.

(ii) The mills should employ technically trained personnel to run the operations, instead of being run by the non-technical proprietors or by their engine drivers and fitters, employing the rule of the thump methods, as is done at present, resulting in great inefficiency and poor quality of products.

(iii) Better quality and higher powered milling equipment should be either manufactured in India or imported for purposes of replacement, without increasing the crushing capacity, since a vast majority of the expellers, etc., employed in the mills are worn out, outmoded and very inefficient. Special quality steels required for the manufacture of better quality equipment should be allowed to be imported freely.

(iv) The oilseeds should be stored under proper storage conditions in order to prevent loss by damage during improper storage, as prevailing at present.

(v) Preliminary treatment of oilseeds before crushing including seed cleaning, removal of spoiled seeds, cracking and flaking seeds is essential in order to obtain greater yield of better quality oil.

(vi) Flexibility of mills to crush more than one variety of oilseeds should be adopted by installing the necessary auxiliary equipment to work the mills practically throughout the year.

Ghanis

(i) Though Wardha Ghani is an improvement over the village ghani both in performance and capacity, it is still far from being satisfactory. Therefore, every effort should be made by calling in engineering and technological skill to improve its efficiency.

(ii) In order to remove dirt, moisture, suspended and mucilaginous impurities from the ghani oil, it should be filter pressed, two or more ghani people owning one filter press.

(iii) In the case of high oil content seeds like sesame (til) and groundnut, double pressing should be done in the ghanis also in order to obtain more oil.

Application of Solvent Extraction Process in India

Being the most efficient process for extracting oils from oilseeds and oil cakes, I consider that this subject should find a place in the present report. As this was not mentioned in the main Report, I set forth my views on this subject here.

According to the information collected by the Committee, about 70—80 per cent. of groundnut cake, all the castor and mowrah cakes and 30—40 per cent. of cottonseed cake and smaller quantities of some other oil cakes produced in the country are used as manure. It is estimated recently in the Memorandum on Human Nutrition *vis-a-vis* Animal Nutrition prepared by the Nutrition Advisory Committee of Indian Council of Medical Research and Indian Council of Agricultural Research that out of one million tons of oil cake used as manure annually, the quantity of oil recoverable is 80,000 tons. Besides, the coconut oil cake produced in ghanis and rotaries (very little is produced in expellers) contains 10.5 to 18 per cent. of the valuable coconut oil required for soap and cosmetic industries, for which we are now importing partly from outside. The oil in the cakes used as manure is not only not required by the soil but it even retards the disintegration and assimilation of the cake by the soil. Therefore, the oil in the oil cakes used as manure is completely wasted. I consider that the waste of such a large quantity of vegetable oils should be stopped and that the oil from the oil cakes used for manure should be recovered and can be used for edible or industrial purposes, as is found suitable.

The solvent extraction plants may be installed in future in Central localities around which expellers, rotaries and ghanis work and should be confined mostly to extract oil from oil cakes meant for use as manure.

Establishment of a Central Research Laboratory

Although just a few big oil mills are having their own technical establishments to control and direct the processing operations in their mills, the vast majority of the oil mills, including most of the big mills, do not have any such facilities. In order to offer technical assistance to the mills to increase their efficiency, it is deemed necessary that a Central Research Laboratory for oilseeds and oils and for developing power milling equipment should be established. As the Indian Central Oilseeds Committee is already collecting cess from the oil mills and as it is also understood to be setting up a Village Oil Industry Training and Research Institute, it would be appropriate

that this Body should also set up the Central Research Institute of Oil Technology for the benefit of the organised sector of the industry.

3. REGARDING THE COMPARATIVE NUTRITIVE VALUE AND KEEPING QUALITY OF OILS PRODUCED BY MILLS AND GHANIS

In Chapter II of the main Report, dealing with the above subject, my colleagues appear to be of the opinion that ghani oil is more nutritive and has better keeping qualities than the mill oil, based on the evidence given by a Food Technologist and the experimental data furnished by Central Food Technological Institute. I am unable to accept the view that nutritionally the ghani oil is superior to mill oil, after careful examination of the existing scientific literature and the evidence received by the Committee. The ghani oils are well known to be lighter in colour than the expeller oils, indicating that they contain less pigments than the mill oils. Secondly, the data furnished by the Central Food Technological Research Institute to the Committee is on a single sample of ghani and expeller oil and that too with such small differences (as can be seen from Appendix Q of the main Report) and will, therefore, be statistically of very little significance. I am also unable to agree with the views of my colleagues when they stated "the fact that the cake containing a higher percentage of oil would furnish the animals with a somewhat greater number of calories is really the crux of the matter in this country" and further that "In the conditions prevailing in India where malnutrition of animals is the rule and their balanced feeding an exception, it is vital in our view that they are fed on cakes containing a higher percentage of oil". There is evidence to show that the animal cannot assimilate fat when fed in excess. Nevertheless, I agree that ghani pressed oil is preferred by a large section of people.

4. INSTALLED AND UTILISED CAPACITIES OF OIL MILLS AND GHANIS AND THE EMPLOYMENT POTENTIALITIES OF THE OILSEEDS CRUSHING INDUSTRY

I am unable to agree with the estimates given for the installed capacities and the employment potential of the mill and ghani sectors of the oilseed crushing industry. The installed capacity of power mills is always calculated on 24 hour (3 shift basis) anywhere and in any industry. In fact, the basis of working out the economics of an oil mill is its working on 3 shift basis. On this basis the installed capacity of power mills in the country will be about 92.7 lakh tons per year and, therefore, the utilised capacity of the mill sector is only 22.4 per cent. of the total installed capacity, as already stated under item 1 of this Note. There is also a divergence

in the estimates of the number of village ghanis in the country, as already pointed under item 1 of this Note. Even taking the higher figure of 4,46,436 for ghanis, the utilised capacity of the ghanis will work out to 61 per cent. and not 50 per cent. as estimated in the main Report (*vide*, item 1 above).

As for the number of persons employed in the two sectors, it is really difficult to make any really dependable estimate. For, in the case of mills, the number of persons employed, according to an estimate of the milling industry is 1,16,246, whereas according to the figures furnished by the State Governments, it comes to 82,010. Also according to the estimate in the main Report, 10 persons are employed on the average per mill. On the other hand, according to the figures furnished by the All-India and State Organisations, 14 persons are employed per mill in Madras, 26 persons in Travancore-Cochin State, 42 persons in Bengal and 27 persons in Gujarat. The divergency between the two estimates is too great. In the case of ghanis, the actual number of ghanis working will be much less. "According to the 1951 census about 1,93,000 self-supporting persons were employed in oil pressing and refining and allowing for the number engaged in oil mills and expellers, the number of those engaged in ghani industry may be placed at about 1,50,000 (*vide*, page 48 of Karve Report). If the estimate of 82,000 persons made in the present report, as employed in the oil mill sector is approximately correct, after allowing for the persons employed in oil refining, the number of persons employed in ghani industry actively will be only a little over 1,00,000. Alternately, if the estimate of 1,50,000 persons given in Karve's Report as employed in the ghani industry is taken as correct, only about 43,000 persons are employed in oil pressing and refining industries, which appears to be too low a figure. Then again, out of the 5 lakh persons estimated in the main Report, to be employed in ghani industry at present, only less than 1,50,000 persons have whole time employment and over 3,50,000 part time employment. Thus, it appears to me that the employment potential in the ghani and mill sector estimated on such conflicting information regarding the number of persons employed at present and the utilised capacity of the two sectors, cannot be relied upon entirely, for recommending the future policy.

5. THE LESS OIL PRODUCED BY GHANIS

The main Report states that "in view of the superior employment possibilities of the ghani industry, there is a case for giving every possible encouragement to it even if it means a slight loss of the

total vegetable oil resources of the country". I am unable to agree that the loss of total vegetable oil resources of the country will be slight. On the other hand, it is very considerable: The loss of oil involved by the ghani crushing as compared to power crushing at the present time and by the end of the Second Five Year Plan, when 50,000 village ghanis are proposed to be replaced by Wardha Ghanis, is estimated as respectively 60,000 tons and 105,400 tons, annually. The calculations made are given in Appendices A and B to this Note. The percentage of extraction of mills, village ghanis and Wardha Ghanis used in the working are those given in the main Report.

The loss of such large quantities of oil should be seriously taken into account in deciding the lines of future development of the Oilseeds Crushing Industry.

However, considering the preference of a large section of people to the ghani produced oil, I am in agreement with my colleagues in recommending to give the necessary financial and technical assistance to the ghanis. But I am unable to agree to their recommendation that subsidy for the installation of the improved type of ghanis may be given to anybody. In view of the large unutilised capacity of the ghanis, this subsidy should be given only in the case of replacement of old ghanis by the improved ones.

6. DEVELOPMENT OF COTTONSEED CRUSHING INDUSTRY

I am unable to agree with my colleagues in their approach to the question of the development of Cottonseed Crushing Industry in India. Firstly, they consider that the possibilities of adding to the oil resources of the country by developing cottonseed crushing is exaggerated, secondly, that the whole cottonseed is better feed to the ill-fed Indian cattle than cottonseed cake because the greater fat content of the seed would greatly enhance the calorific value of the feed for generating the required energy. Thirdly, they state that, as some leading animal husbandry and cattle utilisation workers in the country have told us in emphatic terms that the country must go slow in the matter of encouragement of cottonseed crushing and in view of the above reasons, they recommend that we should go slow in the matter of development of cottonseed crushing. Fourthly, they also do not see any reason why any special concession should be given to the cottonseed industry, mainly because such mills as are crushing cottonseed at the present moment are not running at a loss. Finally, they fear that there is a real danger that if direct or indirect subsidies are given to this industry, the consequential large

scale diversion of cottonseed from Indian villages to the urban areas for crushing by mills might have a dangerous effect on the health of the Indian cattle.

I may set out briefly my views on this subject:

I consider that by developing Cottonseed Crushing Industry properly and fully, the possibilities of adding to the oil resources of the country are very considerable. According to the target fixed for the production of cotton by the end of the Second Five Year Plan, the present production of 15 lakh tons of cottonseed would increase to 20 lakh tons annually. Assuming that, as an ultimate goal, 75 per cent. of the total seed produced will be crushed for oil (in U.S.A. over 86 per cent. is crushed), this will result in the production of 1,80,000 tons of oil even on the present low basis of 12 per cent. yield, about 60,000 tons of linters, about 6,00,000 tons of decorticated cake and about 5,00,000 tons of hulls, which are also given to cattle as roughage.

As for the opinion expressed by my colleagues that cottonseed is a better feed than cottonseed cake to the ill-fed Indian cattle, after weighing carefully all the available scientific and other evidence regarding the comparative suitability of cottonseed and cottonseed cake for cattle feeding, I am of the opinion that cottonseed cake is definitely a better feed than the whole seed itself. It would appear quite essential to state here briefly all the available evidence on the subject:

- (i) Almost all the nutritional authorities in India and the Animal Husbandry Commissioner to Government of India have agreed that all the oil content in cottonseed (14—25 per cent. but mostly between 17 to 22 per cent.) is not necessary or utilised by animals for nutrition.
- (ii) While the Animal Husbandry Commissioner to Government of India stated that the exact fraction of oil utilised by the animal is still a moot point, the Memorandum on Human Nutrition *vis-a-vis* Animal Nutrition prepared recently by the Nutrition Advisory Committee of the Indian Council of Medical Research and Indian Council of Agricultural Research, consisting of four leading Dairy and Animal Nutrition Experts and three Human Nutrition Experts, stated that oil cakes for feeding milch buffaloes should have about 10 per cent. oil to maintain the present high level fat secretion in their milk. The Committee also

recommended that 50 per cent. of cottonseed could be safely crushed without impairing animal nutrition in the country.

- (iii) Both the Animal Husbandry Commissioner and the Cattle Utilisation Adviser to Government of India agree that the effect of feeding whole cottonseed on milch cows is very slight or none at all, while both of them hold that cottonseed feeding is better for milch buffaloes than cottonseed cake.
- (iv) Based on the feeding experiments carried out during 1953-54 at the Indian Dairy Research Institute, Bangalore, on comparative nutritive value of cottonseed and its cake both on buffaloes and cows, the Director of that Institute has observed that although initially there is a significant increase in the butter fat content of the milk by feeding with cottonseed over that of feeding with cottonseed cake, at the end of 10—12 weeks, this increase in butter fat content does not continue. He, therefore, considers that a part of the oil in cottonseed can profitably be extracted for human use. His letter No. H/63, dated 24th July 1954 to me is given in Appendix 'C' to this Note. A copy of this letter was furnished earlier to the Committee by me.
- (v) Exhaustive feeding experiments conducted at the Indian Veterinary Research Institute, Izatnagar, during the past 4, 5 years on the comparative nutritive values of different oil cakes and of cottonseed and cottonseed cake (*vide*, Appendix R to the main Report) showed no significant difference between the two, as already discussed in the main Report.
- (vi) Cottonseed and Cottonseed cake are valued mainly for their protein content. (a) Comparative studies made on the nutritive values of whole seed and the cake showed that the decorticated cottonseed cake contains 34—38 per cent. digestible proteins compared with 17 per cent. in the whole cottonseed (*vide*, Feeds and Feeding by F. B. Morrison, 1942, page 980 and 981). (b) Animals fed too large amounts of cottonseed may scour badly on account of the large amount of oil. In trials on dairy cows in U.S.A., it has required 171—205 lbs. of cottonseed to equal to 100 lbs. of high grade cottonseed meal (*vide*, Feeds and Feeding by F.B. Morrison, 1942, page 366). (c) The decorticated cottonseed cake is found to contain more than

double the protein content of the whole cottonseed, as per the analysis conducted at the Oil Technological Institute, Anantapur. (d) Sri D. Y. Athawale, the then Oil Expert to Uttar Pradesh Government, has given feeding values of the cottonseed and its different products and found that decorticated cottonseed cake (from the nutritive point of view) is nearly twice as rich in protein content as cottonseed (*vide*, Indian Farming, Volume 5, No. 7, 1944, page 308).

- (vii) The large scale feeding trials carried out at Government Military Dairy, Bangalore, in 1914 using to the extent of 90,000 lbs. of cake and 3,60,000 lbs. of hulls per year on 40 animals (buffaloes, cows, bulls and heifers) gave excellent results. It was also reported that during these experiments, the animals take to the cake and the hull greedily from the first as much as is put in front of them. Mr. B. W. Rouse, Manager of the Military Dairy, who conducted the experiments, stated "there is no better feed as a concentrated ration for milch stock than cottonseed meal". A copy of the letter of the Manager is enclosed in Appendix D to this Note and was also furnished to the Committee earlier.
- (viii) Apart from the Western Countries, where cottonseed is extensively crushed for oil and the animals fed with cake, but where it may be said that balanced rations are given to animals, cottonseed is also crushed extensively without any restriction in countries like China, Egypt and Iran. In China, where large quantities of other oilseeds are also produced as in India, 2,95,000 tons of cottonseed oil was produced in 1937 (reliable figures not available for later years due to unsettled conditions). China is essentially an agricultural country like India and it cannot be said that balanced rations only are given to the cattle in that country.
- (ix) My colleagues seem to hold the view that because of the ill-fed condition of the Indian cattle, large quantities of fat that is available in whole cottonseed is necessary to greatly enhance the calorific value of the feed for generating the required energy". I am unable to agree with this view, since, as already mentioned under (i) above, all the oil in the cottonseed is not necessary or utilised by

the animals for nutrition. Further, there is ample evidence in scientific literature to show that when an animal is given a large proportion of fat in the diet, it will not all be metabolised but will be laid down in the tissues largely in its original form (*vide*, The Lipids by Deuel Volume II; Biochemistry, 1955, page 525) and will even cause interference with the normal production of fat in the animal and must therefore, be regarded as definitely abnormal, if not almost pathological (*vide*, The Chemical Constitution of Natural Fats by Hilditch, 1949, page 83).

Further, in emphasising too much on the need for extra amount of fat to the ill-fed Indian animals, the greater need for protein matter to such animals, which will be furnished by cottonseed cake to a much greater extent than the whole seed, seems to have been overlooked in the main Report.

From the available evidence summarised above, it is clear that cottonseed cake is a better feed than whole cottonseed even for the ill-fed Indian cattle. I am, therefore, of definite opinion that no alarming view need be taken in feeding Indian cattle with cottonseed cake instead of cottonseed, whole. There need be no fear that the farmer does not feed his cattle with cottonseed cake either, as the farmer and the milkman are getting used to feeding their cattle with cottonseed cake, as is gathered from mills crushing cottonseed and also from my experience at Oil Technological Institute, where all the 12,000 lbs. of cake produced recently was readily sold. As for the danger envisaged by my colleagues that, if cottonseed crushing is encouraged, the consequential diversion of cottonseed from Indian villages to the urban areas for crushing by mills might have a dangerous effect on the health of the Indian cattle, the fear seems to be based on the conviction that cottonseed rather than cottonseed cake should be fed to the cattle. I have already discussed above that cottonseed cake is even a better feed than the whole cottonseed. If on the other hand, the fear is that when once the seed moves away from the village, it will not come back to the village even in the form of cottonseed cake, it cannot be so. For even at present the Kapas from the village go mainly to the ginneries in the urban areas for separating the cotton from the seed. If the seed can return from the ginneries to the villages, the cottonseed cake can also go the same way to the villages after the seed is crushed in the mills situated near to the ginneries.

I consider that the lines on which Cotton Crushing Industry should be developed in future should also be indicated briefly. At present, mainly American varieties of cottonseed are being crushed by the mills, as they are considered to have greater amount of oil and as they are cheaper than the Desi varieties. But from the analysis of the large number (exceeding 400) of representative samples of different Desi and American types of cottonseeds from all the cotton producing States in India carried out at the Oil Technological Institute, Anantapur, it is evident that 90 per cent. of the Desi cottonseed also contain oil of 15 per cent. or higher and over 60 per cent. of Desi seed contains 17 per cent. or higher oil. Data obtained from analysis of 388 of these samples is summarised in Appendix N of the main Report. As it will be economical to crush cottonseed containing 15 per cent. or more of oil and as 75 per cent. of the total seed produced in India is of Desi variety, I consider that Desi as well as American variety seed should be crushed for oil.

Further, while Desi variety of seed is undoubtedly less fuzzy than the American type seeds, it has been found that the Desi variety seed contains fuzz varying from 1.0—15.4 per cent. (compared to 1.7—17.9 per cent. fuzz found on American variety seed) and that nearly 60 per cent. of desi seed contains lint of 5 per cent. or more. As stated earlier, the linters of cottonseed are required for rayon and gun cotton industries and the actual production of linters is far below the target fixed in the First Five Year Plan. Therefore, I recommend that delinting and decorticating should be done before crushing the seed. Other advantages of adopting this method in preference to crushing the whole seed are the following:

- (i) Better quality and higher per cent. protein cake is obtained.
- (ii) Higher yield of oil (about 1 per cent.) is obtained.
- (iii) Less dark coloured oil, giving less refining losses is obtained.

In order to carry out delinting and decorticated method of crushing cottonseed, some additional equipment such as seed cleaning, delinting, dehulling or decorticating, machinery and flaking rolls will be required. I recommend that the import of these equipment should be permitted free of customs duty.

Finally, as cottonseed crushing is an infant industry in India with great potentialities and with its own other serious problems of refining, etc., every possible encouragement should be given to the industry.

(Sd.) K. S. MURTI,
*Member, Oilseeds Crushing
 Industry Inquiry Com-
 mittee and Principal, Oil
 Technological, Institute,
 Anantapur.*



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APPENDIX A

Quantity of less oil produced by the ghanis due to their inefficiency at the present level

The quantities of various oilseeds crushed by ghanis were furnished by the Khadi Board as furnished to them by the Central Statistical Organisation, relating to the year 1951. The figure for ghani crushing of copra alone is given by the Secretary, Indian Central Coconut Committee.

| Name of oil seed | Quantity of Oilseeds Crushed (in lakh tons) | % Extrac- tion by mills | % Extrac- tion by ghanis | Difference of extraction (%) | % of ex- traction by Wardha Ghani |
|---------------------------------|---|-------------------------|--------------------------|------------------------------|-----------------------------------|
| 1. Groundnut | 5.68 | 40.0 | 35.0 | 5.0 | 36 |
| 2. Mustard & rapeseed | 1.97 | 35.0 | 30.0 | 5.0 | 32 |
| 3. Sesamum | 2.46 | 42.0 | 37.0 | 5.0 | 39 |
| 4. Kardi & Niger | 1.00 | 33.0 | .. | .. | .. |
| 5. Linseed | 0.25 | 35.0 | 30.0 | 5.0 | 32 |
| 6. Castorseed | 0.10 | 40.0 | 35.0 | 5.0 | 37 |
| 7. Mowah | 0.10 | .. | .. | .. | .. |
| 8. Coconut | 0.36 | 64.0 | 58.0 | 6.0 | 60 |
| | 11.92 | | | | |

| | Estimate of less oil production. | Tons of oil |
|------------------------------------|----------------------------------|------------------------------|
| 1. Groundnut | 5,68,000 X 5 100 | 28,400 |
| 2. Mustard and rape seed | 1,97,000 X 5 100 | [9,850 |
| 3. Sesamum | 2,46,000 X 5 100 | 12,300 |
| 4. Linseed | 25,000 X 5 100 | 1,250 |
| 5. Castor | 10,000 X 5 100 | 500 |
| 6. Coconut | 36,000 X 5 100 | 2,160 |
| 7. Kardi and Niger [. | 1,00,000 X 5 100 | 1 5,000 |
| 8. Mowah | 10,000 X 5 100 | 500 |
| | | 59,960 or 60,000 tons. |

APPENDIX B

Estimate of less oil that would be produced by the end of Second Five Year.

Basis for the estimation is that all the existing ghanis would work to their fully capacity, that 50,000 of the old ghanis will be replaced by 50,000 Wardha Ghanis, which is estimated to give employments to 7 lakh persons, in the main Report. Also that the present proportion of various oilseeds crushed by ghanis will be maintained.

Installed capacity of 4,46,436 ghanis is 19.10 lakh tons.

It is presumed that 50,000 ordinary ghanis will be replaced by 50,000 Wardha ghanis, by the end of the Second Five Year Plan.

Then the crushing capacity of 3,96,436 (4,46,436—50,000) will be

$$\frac{3,96,436 \times 19.1}{4,46,436} : 16.96 \text{ lakh tons of seed.}$$

The less production of oil that will result if 11.92 lakh tons of seed are crushed by the ghanis is 59,960 (see Appendix A).

If 16.96 lakh tons is crushed, the less production of oil will be

$$\frac{16,96 \times 59,960}{11.92} : 85,320 \dots\dots(A)$$

The total crushing capacity of 50,000 Wardha ghanis, on the basis of 10 seers per charge and 5 charges per day and 300 working days will be

$$\frac{50,000 \times 5 \times 10 \times 2 \times 300}{2240} : 6,69,643 \text{ tons.}$$

The difference of per cent. extraction between mill and Wardha ghanis being 3.0 per cent. (except for groundnut for which it is 4 per cent.). But only 3 per cent. for this seed also is taken for easy calculation.

Less oil produced:

$$\frac{6,69,643 \times 3}{100} : 20,089 \dots\dots(B)$$

Total less oil: A plus B: 85,320 plus 20,089: 105,409 or 105,400 tons.

APPENDIX C

COPY:

INDIAN DAIRY DEPARTMENT
(GOVERNMENT OF INDIA)

No. H/63.

INDIAN DAIRY RESEARCH INSTITUTE

Office of the Director of Dairy Research,
Bangalore-1, dated 24th July 1954.

To

Shri K. S. Murti,
Oil Technological Institute,
Anantapur.

Dear Sir,

With reference to your D.O. No. 25/OTI/54, dated 3rd June 1954 addressed to Dr. Sen and the subsequent reminder (No. 25/OTI/54, dated 14th July 1954), it is regretted that a reply could not be sent earlier as Dr. Sen has been mostly away on tour.

The results so far obtained of the work which is being carried out at this Institute on the comparative nutritive value of the cottonseed and its cake tend to show that feeding cottonseed as the sole item for production, the butter fat in milk of both buffalo and cow registers a significant increase over that of feeding an isodynamic dairy mixture containing maximum amount of cottonseed cake. This increased secretion of butter fat, however, is not sustained for a long period. At the end of about 10—12 weeks it assumes the same course as that followed under the regime of feeding of cottonseed cake. This observation seems to lead to the conclusion that a part of the oil in cottonseed can profitably be extracted for human use.

As soon as we are in a position to scrutinise our data in greater detail we hope to publish the work and send you a reprint in due course.

Yours faithfully,
(Sd.) S. C. RAY,
for Director of Dairy Research.

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APPENDIX D

Extract from the Booklet 'Cottonseed Products' by Shri C. Ranganatha Rao Saheb, B.A., B.L., with an introduction by Mr. Alfred Chatterton, C.I.E.

Year of Publication : 1914.

Department of Industries and Commerce, Library Book No. 153-M,
Pages V—VII.

Office of Government Military Dairy,
Bangalore, dated 26th March 1914.

From

The Manager,
Industries and Commerce Committee,
The Mysore Economic Conference, Bangalore.
Reference your No. 1595, dated 25th March 1914.

Sir,

I have the honour to forward herewith the information which you require in connection with cottonseed meal and hulls.

I have the honour to be,
Sir,

Your most obedient Servant,

S. W. ROUSE,

Offg. Manager, Govt. Mil. Dairy,
Bangalore.

There is no better feed as a concentrated ration for milch stock than cottonseed meal. The animals take to it greedily, and will consume from the first as much as it put in front of them. Cottonseed meal is an economical ration as it can be fed dry or in the form of gruel. Animals thrive and do better on it than any other ration fed.

The quantity to feed to an animal, of course, depends upon the resources of the feeder, but in Government dairies the quantity fed is equal to 10 lbs. per 1,000 lbs. Live weight and also upon the milking capacity of the animal—the better the milker, the more the cottonseed meal fed. For dry animals it is too expensive a ration to feed; therefore only 1 lb. per animal per day is given to keep the animal in good

condition. Fed to young stock—it is per excellent, and the animals not only come in season quicker but it also keeps them sleek and well nourished and in a fit condition to bear their calf. At this farm the young stock are being fed 6 lbs. cottonseed meal per day, they are in excellent condition and the majority of them are in calf at 2 years, some have calved at 2 years and 3 months and are giving 30 to 40 lbs. of milk per diem. This is due to nothing but feeding them with a good ration like cottonseed meal from birth.

Cottonseed hulls are a good filling ration and can be used with economy to fill up the bulk of the ration and when fodder such as ragi, paddy straw or hay is bringing more than Re. 1 per 100 lbs. It can be fed up to 20 lbs. per day per adult animal with economy.

The animals take to it readily and if a little salt is mixed with it the animals clear it up for the first. The best method to feed it is to mix with other grains or meal in the form of a slop or gruel and no difficulty is experienced whatever, the animals clearing up all that is put before them.

| | Special class 20 lbs. of milk per day and over (1) | 1st class 10—20 lbs. milk per day (2) | 2nd class 4 to 10 lbs. milk per day (3) | Dry (4) |
|------------------------------|---|---|---|------------|
| Buffaloes : | | | | |
| Cottonseed meal | 6 | 4 | 2 | 1 |
| Cottonseed Hulls | 10 | 8 | 6 | 10 |
| Bran | 2 | 1 | 1 | 1 |
| Dhall Bhusa | 2 | 1 | 1 | .. |
| Brewers Grains wet | 8 | 6 | 4 | .. |
| Ragi straw | 20 | 20 | 20 | 20 |

Cows :

| | | | | |
|----------------------------|----|----|----|----|
| Cottonseed meal | 6 | 4 | 2 | 1 |
| Cottonseed hulls | 8 | 6 | 6 | 10 |
| Bran | 3 | 2 | 1 | 1 |
| Dhall bhusa | 2 | 1 | 1 | .. |
| Brewers grains | 10 | 8 | 4 | .. |
| Ragi straw | 20 | 20 | 20 | 20 |

| | <u>1 to 2 years</u> | <u>9 to 12 months</u> | <u>6 to 9 months.</u> |
|----------------------------|---------------------|-----------------------|-----------------------|
| Young stock Reifers | | | |
| Cottonseed meal | 6 | 5 | 4 |
| Cottonseed hulls | 2 | .. | .. |
| Bran | 2 | 2 | 1 |

From the above you will notice that cottonseed meal and hulls are fed liberally.

The European and Indian Cows do exceedingly well on the cottonseed meal and hulls and the buffaloes eat them greedily.

The quantity consumed at this farm is as follows:

| | | |
|-----------------------------------|-------|-------------------------------|
| Cottonseed meal 250 lbs. per diem | . . . | $250 \times 30 \times 12 =$ |
| | | 90,000 lbs. per year. |
| Cotton hulls 1,000 lbs. per diem | . . . | $1,000 \times 30 \times 12 =$ |
| | | 3,60,000 lbs. per year. |

The price of cottonseed hulls at Navsari is Rs. 19 per ton and when landed in Bangalore the price per ton comes to Rs. 28 including freight. The price of meal is Rs. 70 at Navsari and here it amounts to Rs. 82 per ton.

The quantity approximately required would be.

| | |
|-----------------|---------------------|
| Meal | 60 tons per annum. |
| Hulls | 300 tons per annum. |

S. W. Rouse.

Offg. Manager, Govt. Mil. Dairy,
Bangalore.

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**SUPPLEMENTARY NOTE ON THE OILSEEDS CRUSHING
INDUSTRY RECORDED BY SHRI RATILAL M. GANDHI,
MEMBER, OILSEEDS CRUSHING INDUSTRY INQUIRY
COMMITTEE.**

Broadly speaking, I am more or less in general agreement with the main recommendations of the Oilseeds Crushing Industry Enquiry Committee. I have, therefore, signed the report. I would, however, like to supplement the same by the following observations:—

In accordance with the preamble to the terms of reference of the Enquiry Committee, a rapid survey of the state of the oilseeds crushing industry (both by mills as well as village ghanis) in the country has been made by the Committee and has been noted at various places in different chapters of the Report. I wish, however, that a separate chapter had been exclusively devoted to this aspect of the enquiry in a rather more comprehensive manner so as to make a thorough probe into the conditions of the oil-milling industry as well as of the village ghani industry.

Our country is one of the prominent and leading oilseeds producing countries in the world and has now come to occupy a place as one of the principal sources of supply of oils and fats for the requirements of consuming and manufacturing countries after catering for the internal requirements of our country, both by way of domestic consumption and industrial utilisation. The oil-milling industry has derived considerable fillip both during and after the last world war. It has, however, developed in a haphazard manner and is in a disorganised state. It lacks scientific and planned development on an economic basis. This point has been elaborated in Chapter IX and as per the suggestions made therein the milling industry requires a sort of rationalisation. This industry has not been at all developed like the textile, jute, sugar, and other big organised industries. The oil milling industry in India may be considered a small scale and seasonal industry scattered in different villages and towns excepting a few large scale units in urban areas. The oil milling industry plays an important role in India's economy, and therefore, should be developed on more advanced basis. Compared to the crushing industry of advanced European countries, the crushing industry of our country

can be considered to be in its infant stage. It would have been therefore, more helpful if some attention had been paid to the study of the growth and development of the crushing industry in advanced foreign countries with a view to suggest ways and means for the planned and scientific development of the oil-milling industry in our country.

The biggest problem of the oil-milling industry is the idle crushing capacity. It is estimated that about half of the crushing capacity remains idle. The fullest utilisation of the installed crushing capacity should, therefore, be the desideratum to be devoutly wished for.

I agree that in view of the above position when the installed crushing capacity (both milling and village ghanis) is not fully utilized, it being over-expellerised and because of idle ghanis no new oil-mills may be allowed to be set up for the present. However, it would have been more helpful if greater attention had been paid to the increase in production envisaged in the Second Five Year Plan and accordingly to plan for the development of this industry. The adequate and regular supply of raw materials, financial assistance, technical help, more transport facilities by way of adequate supply of tank wagons, box wagons, etc., for movement of raw materials as well as their respective oils, etc., would indeed go a long way in solving some of the present difficulties confronting the oil-milling industry. The transfer of oil-milling industry from one place to another may also be allowed.

In Chapter VI it has been mentioned on Page 19 that it is obvious that the ghani has far better employment possibilities. While making a comparative assessment about the employment potentialities provided by the ghani as well as by the mills, it may be borne in mind that milling industry, besides providing avenues of direct employment also provides avenues of indirect employment in a number of fields.

In the present pattern of our country's economic and industrial policy, more emphasis is being placed on the development of village industries, specially because of more employment possibilities and potentialities. Considering this oil crushing industry from this point of view, village ghani oil crushing has its own importance in our economy. Proper development of this vanishing industry requires special attention. Ways and means have been suggested in the body of the Report. Implementation of the same is necessary and suggestion to give necessary advance by way of loan may be conceded.

In the present context of the development of our economy, relationship between the oil-milling industry and the village ghani industry should be considered in its proper perspective. The roles of both these sectors of the crushing industry should not be considered to be antagonistic to each other, but they should be looked upon as supplementary and complementary to each other. It should be borne in mind that the ghani industry, as a result of many concessions granted to it by the Government, already enjoys an advantage of Rs. 5 per Bengali Maund of oil over the oil-milling industry. As far as the question of help to both these sectors of the oil crushing industry is concerned, they should be treated on an equal footing, because both these sectors play an important part in the economy of India and so deserve greater attention and more careful consideration. There should not be any step-motherly treatment to the oil-milling industry.

In Page 33 of the Report it has been mentioned that the State should guarantee the losses to enable the oilmen and/or ghani to hold out at the time of a fall in prices. It should be appreciated that guarantee of losses by the Government is not generally a good business proposition. At best, it may be taken as an encouragement to the village oil ghani. It should be clearly understood that the Government at no stage should be asked to guarantee the losses. But what is intended as is clear from subsequent observation, is provision of credit facilities in terms of repayable loans.

It has been mentioned at various places in the body of the Report that the greatest handicap in assessing the proper value of both the sectors of the present oil crushing industry is the paucity of up-to-date and accurate statistics and other data as well as the difference about the content of oil in different oilcakes and their use as cattle-food, etc. Even scientists differ on these controversial questions. The figures of production of oil by ghanis as well as other statistical information contained in the Report need re-examination.

Tremendous loss and wastage of oil that take place as a result of leakage in transit is another important problem worth tackling. The help and advice of scientists and technicians may be sought to devise such containers as would either prevent or minimise the loss of national wealth arising from leakage.

Minor Oilseeds

As mentioned in the body of the Report in Chapter X on Minor Oilseeds, Nigerseeds and Kardiseeds cannot be termed as minor oilseeds as their production has increased very rapidly and is still likely

to increase further. The present production of both these oilseeds comes to about three lakh tons put together. Both these oils are consumed generally in the regions in which they are crushed. Some quantities are also exported. The production figures of these oilseeds given in Appendix M are not up-to-date. It is necessary that these figures are revised and made up-to-date so that proper justice can be done to them.

Chapter XI—Development of cottonseed crushing industry

Respecting the opinion of scientists about the utilisation of Cottonseed, it may be agreed for the present that 20 per cent. of the production of Cottonseeds in the country may be allowed to be crushed by oil mills. However, there should be no absolute rigidity about the percentage. Having regard to the cattle feeding requirements, this problem should be reviewed from time to time in terms of the changing conditions.

solvent extraction process

One more important point to be considered is about the solvent extraction process industry which is to be considered as the most up-to-date and most efficient and economic method of extraction of oil. It is extensively used in many advanced foreign countries. The Government of India have already adopted the policy of this process to extract more oil from oilcakes and have given sufficient number of licences. This is a new sector in our industry which should be utilized and developed in its proper perspective.

On the whole, it may be said that the Oil Crushing Industry is yet in its infant stage from the point of the changing pattern of our internal requirements of vegetable oils as well as the developing export trade. Although oil has its importance as an article for local consumption, it is an important item in our gradually expanding export trade and an important raw material for many manufacturing industries. The production of oilseeds in the country is also increasing under various plans and it should, therefore, be in the fitness of things, having regard to the increase in production contemplated in the Second Five Year Plan that, various sectors of the Oil Crushing Industry are kept under constant watch and necessary assessment and adjustment made accordingly for a rational, scientific and economic development of the various sectors of this industry.

(Sd.) RATILAL M. GANDHI.

**NOTE OF DISSENT BY SHRI SATISH CHANDRA DAS GUPTA,
MEMBER, OILSEEDS CRUSHING INDUSTRY ENQUIRY
COMMITTEE.**

The majority report recommends that "The installed crushing capacity of the milling industry may be allowed to operate in respect of oilseeds except Sesamum" (page 23 of typescript).

It has been estimated that the utilised capacity of the mills is about 67 per cent. of the installed capacity. 33 per cent. remains unutilised (page 12 of typescript).

By the above recommendation the milling industry is allowed to crush 50 per cent. more than what the industry is crushing today.

The present crushing capacity of 30 lakh tons of the mills is utilised to 67 per cent. Therefore their present crushing is 20 lakh tons. The ghani crushing capacity is 20 lakh tons and is used 50 per cent. only. Therefore, the present ghani crushing is for 10 lakh tons.

If the milling industry is allowed to work up to full capacity and is able to do so, then nothing will be left for the ghanis to crush. The present 10 lakh tons which the ghanis crush will be taken over by the mills if the mills are able and are allowed to crush to the full capacity of 30 lakh tons.

The Karve Committee also did not suggest any restrictions on the mills to work up to their capacity but at the same time the Committee proposed to provide that certain seeds were to be reserved for crushing in ghanis. To quote from the Committee:—

"The definite fields allocated to ghani and the milling industry were:—

1. to reserve the crushing of certain edible seeds such as Sesamum, Rape and Mustard exclusively for the ghani industry,
2. to divert larger portion of groundnut to ghani, and
3. to allocate the whole of cottonseed to the mill industry to enable to maintain utilisation of capacity."

After this the recommendation of the Karve Committee comes:—

"As even the existing capacity of the mills is not fully utilised we are of the view that no new mills should be allowed to

be set up except in areas where alternative methods of crushing are not feasible. It is not necessary to prevent by legislation fuller utilisation of capacity by the oil mills."

The recommendations in the present report while agreeing with the finding of the Karve Committee so far as the full working capacity of the mills is concerned do not adopt the reservations recommended by the Committee. Further, the making of oil seeds available to the ghanis should be taken up as a programme as suggested by the Karve Committee. In this respect also the majority report of O.C.I.I.C. fails to lay down a definite programme.

Considering all these factors, I have to differ from the majority report and would recommend the adoption of the recommendation of the Karve Committee as set out in page 49 of the

"Report of the Village and Small Scale Industries' (Second Five Year Plan) Committee October, 1955."

II

"HAND PRESSES FOR CRUSHING OIL SEEDS"

(page 36 of the main report).

In the opinion of the Committee:

"The extraction of oil through these hand presses involved a considerable amount of cruelty to the workmen and we are of the opinion that these hand presses may be replaced by power driven mills."

There is no more cruelty in working hand presses for oil than there is in the working of the fireman for hand feeding steam boiler or in the labour of the cultivator working his kodali or Phaora or in our women drawing water from deep wells and carrying it home over long distances.

The man who earns a living by working a hand oil press does no immoral thing. He should not be deprived of his source of income out of a sense of mercy for him unless a lighter and yet equally paying work is provided for him.

The 6th July, 1956.

(Sd.) SATISH CHANDRA DAS GUPTA.